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DISEASES CAUSED BY BACTERIA AND FUNGI

SLANETZ, L. W., BARTLEY, C. H. & ALLEN, F. E. (1959). **The immunization of dairy cattle against staphylococcal mastitis.**—*J. Amer. vet. med. Ass.* **134**, 155-161. [Authors' summary modified.] **2312**

Staphylococcal toxoid or killed vaccine-toxoid stimulated the formation of antibodies and increased resistance to staphylococcal mastitis, and reduced the number of acute flare-ups in infected cows over periods of up to 18 months. Vaccination did not usually cure quarters with chronic infections. When challenged with 1 to 5 thousand million virulent mastitis staphylococci *via* the teat canal, vaccinated cows developed only brief mild reactions while severe, acute reactions developed in unvaccinated cows. When the challenge dose was increased to about 20 thousand million organisms, the vaccinated cows developed acute infections.

PILLET, J., GIRARD, O., DUTHEIL, H. & ORTA, B. (1959). Recherches sur l'immunisation de la brebis contre la mammite staphylococcique. **[Immunization of sheep against experimental staphylococcal mastitis.]**—*Ann. Inst. Pasteur* **96**, 365-368. [English summary modified.] **2313**

Sheep vaccinated *via* the teat duct with a mixed vaccine (alpha and beta toxoids plus selected bacterial cells) resisted challenge infection 1–3 weeks later.

COLES, E. H. (1958). **Phage-host relationships in *Staphylococcus aureus* of animal origin.**—*Dissertation, Kansas* pp. 104 [Microfilm]. **2314**

C. studied 212 strains isolated from bovine mastitis, 9 from dogs and 1 from a cat. Filtrates were prepared from 95 of them and tested for the presence of phage by plating onto cultures of 100 strains: all the filtrates lysed 2 or more of the cultures and 17 could be placed into 5 groups having similar patterns of lysis. The staphylococci were also typed with 24 phages used for human strains: 86 of 173 cultures were resistant to all phages, 46 were lysed by one phage only and 28 were lysed by two phages. Eight human phages were "adapted" by propagation on staphylococci of animal origin and were tested on 168 of the strains previously tested. More cultures were lysed by all except one of the "adapted" phages and only 32 strains were not lysed by any of them, while 11 strains were lysed by 7 or 8 of the phages.

Ten phages selected from lysogenic cultures were tested on the 168 strains. More cultures were resistant to all phages (74) than the "adapted" phages, but the number was less than with human-type phages. Three phages, two of which were "adapted", were selected for typing *Staph. aureus* from mastitis in 6 herds and 127 cultures were classified into 5 groups according to the phage pattern. The results were discussed in detail. In one herd 7 cows harboured more than one strain of organism in the udder.

Staphylococci from dog, cat and horse were all resistant to phages isolated from bovine strains. The general conclusion was that a further search would be necessary to find phages suitable for typing staphylococci of animal origin, and that the method of adaptation may be of value in this connexion.—R.M.

JOHANOVSKÝ, J. (1958). **Role of hypersensitivity in experimental staphylococcal infection.**—*Nature, Lond.* **182**, 1454. **2315**

Rabbits were rendered hypersensitive by repeated small doses of staphylococci. Cells from the spleen or peritoneal exudate of these rabbits were transferred i/p to normal rabbits. These recipients were tested a day later with staphylococcal toxoid and vaccine and their reactions were recorded up to 48 hours later. They

were then infected i/v with virulent staphylococci. Skin hypersensitivity of the delayed type developed in the recipients, bacteraemia was higher in them than in control rabbits, and more micro-organisms were found in their organs than in those of controls. It is concluded that the tissues of sensitized animals, after contact with the antigens of the infecting micro-organism, undergo pathological changes which favour the development of the infection.—M.G.G.

LAWRENCE, J. C. (1959). **Some effects of staphylococcal and streptococcal toxins upon mammalian skin in tissue culture.**—*Brit. J. exp. Path.* **40**, 8-14. [Author's summary modified.] **2316**

The effects of staphylococcal alpha toxin, streptolysin O and streptolysin S on skin respiration and on the migration and viability of epithelial cells were investigated *in vitro*. Staphylococcal alpha toxin was extremely toxic to skin, streptolysin O less so, and streptolysin S seemed non-toxic. Both staphylococcal alpha toxin and streptolysin O appeared to activate rapidly toxic mechanisms in skin. Specific staphylococcal antitoxin did not prevent the effect of the alpha haemolysin if added 1 hour later, but afforded partial protection if added before this time. Previously mixed toxin and antitoxin had no effect on skin cultures.

RICHOU, R., QUINCHON, C. & RICHOU, H. (1958). Sur la présence simultanée d'antistreptolysine et d'antitoxine staphylococcique d'origine naturelle dans les sérums humains et dans ceux de différentes espèces de la série animale. **[Occurrence of antistreptolysin and staphylococcal antitoxin in sera from man, horses, cattle, sheep and rabbits.]**—*Rev. Immunol.* **22**, 465-469. **2317**

Sera from 80 human beings, 41 horses, 7 cattle, 11 sheep, and 18 rabbits were examined. In most of the rabbits antistreptolysin titres were low—less than 10 units; in the other 4 species they were higher—mostly between 30 and 200 units. There was no correlation between the the titres of antistreptolysin and staphylococcal antitoxin.—M.G.G.

WILEY, G. G. (1959). **The lack of bactericidal effect of mouse blood for nonvirulent group A streptococci.** — *J. Immunol.* **82**, 62-68. [Author's summary modified.] **2318**

Evidence is presented suggesting that the slowness of ingestion of streptococci by mouse neutrophiles (allowing extracellular proliferation to proceed relatively unchecked) is an important factor contributing to the poor bactericidal power of mouse blood. However, the existence of a strain that is readily phagocytosed, the growth of which is only moderately inhibited by mouse blood, suggests that factors other than ingestion rate are concerned.

MAFFEY, J. (1959). **Methods for the control of the aspecific type of bovine mastitis.** — *Vet. Rec.* **71**, 124-128 & 129. **2319**

In 198 of the 234 herd outbreaks of mastitis investigated infection was assessed as being due to organisms other than *Streptococcus agalactiae*. In almost every case, inefficient milking methods combined with faulty machine management or unsuitable machine parts were found. As a result of the recommended improvements in cowmanship and adjustments and replacements to machines combined with antibiotic treatment of established cases of disease, resolution in 4–6 weeks occurred in 80% of these non-specific outbreaks.—A. ACKROYD.

BARNUM, D. A., THACKERAY, E. L. & FISH, N. A. (1958). **An outbreak of mastitis caused by *Serratia marcescens*.** — *Canad. J. comp. Med.* **22**, 392-395. [Summary in French.] **2320**

An outbreak caused by *S. marcescens* [*Chromobact. prodigiosum*] involved 17 quarters of 11 cows. Morphological, staining, biochemical and growth characteristics of the organism are described. Animal inoculations showed it to be lethal for g.pigs and mice and capable of producing mastitis in cows. Intramammary infusion of neomycin, 4 or 5 g. over a three day period, eliminated the organism.

—C. L'ECUYER.

VAN NESS, G. B., PLOTKIN, S. A., HUFFAKER, R. H. & EVANS, W. G. (1959). **The Oklahoma-Kansas anthrax epizootic of 1957.** —*J. Amer. vet. med. Ass.* **134**, 125-129. [Authors' summary modified.] **2321**

A major epizootic of anthrax caused a loss of 1,627 farm animals on 741 premises.

The epizootic was associated with excessive rainfall followed by prolonged hot, dry weather. This region of normally acid soil had several years of drought. Anthrax occurred in areas subjected to prolonged moisture damage where, during this period, the flow of ground water had created neutral or alkaline soil conditions.

A non-capsulated Sterne-strain vaccine was used extensively in this outbreak with apparent success.

JOCHEM, E.-M. (1958). Rôle de *Bacillus anthracis* dans la panhémagglutination. [**Role of the anthrax bacillus in panhaemagglutination.**] — *Ann. Inst. Pasteur* **95**, 760-762. [English summary.] **2322**

Panhaemagglutination can be realized by adsorption onto the surface of erythrocytes of a substance, which is thermostable at 100° and is present in filtrates of *B. anthracis* cultures. The factor can react according to the mechanism of passive haemagglutination, with natural agglutinin present in normal human serum and different from anti-T agglutinin.

CROWLEY, P. (1959). **Eradicating bovine tuberculosis in the Irish republic.**—*Agriculture, Lond.* **65**, 615-618. **2323**

Since an eradication scheme was introduced in 1954, 7 countries having 1·25 million cattle have been subjected to compulsory tuberculin testing with disposal of reactors, and it is expected that these counties will become accredited TB.-free areas by 1960. These measures have not yet been applied to the 6 main dairying counties (having 1·8 million cattle), where the incidence of TB. in cows is over 40%, but steps have been taken to protect calves from infection. —R.M.

CHODKOWSKI, A. & ŻORAWSKI, C. (1959). Badania nad gruźlicą bydła w Polsce. [**Bovine tuberculosis in Poland.**] — *Med. Wet., Warszawa* **15**, 12-14. [Summaries in English and Russian.] **2324**

In parallel tests with Koch's O.T. and Weybridge P.P.D. on 3,401 cattle on state and collective farms, 29·3% of positive and 13·7% of doubtful reactions were obtained with Koch's O.T. and 37·2% and 11% respectively with Weybridge P.P.D. Of 857 privately owned cattle tested, 6% were positive and 10·8% doubtful with Koch's O.T. and 10·6% and 10·8% with Weybridge P.P.D.

G.pig inoculation with milk samples from 80 farms revealed tubercle bacilli in milk from 11 farms (13·7%), though no evidence of tuberculous mastitis was found on the farms. —M. GITTER.

MILBRADT, H. (1959). Zehn Jahre Bekämpfung der Rindertuberkulose in Niedersachsen mit einem Anhang über den bisherigen Verlauf der Bekämpfung der Rinderbrucellose. [**Ten years' control of bovine TB. in Lower Saxony and some data on control of brucellosis.**]—*Dtsch. tierärztl. Wschr.* **66**, 126-131. [Summary in English.] **2325**

In 1949 about 32% of the cattle in Lower Saxony were tuberculous. Ten years later, on the 1st of January 1959, 93·7% of the 195,403 dairy herds were attested as free from TB. 86·5% of the herds were free from brucellosis in January 1959, compared with 19% in June 1956.—M.G.G.

HUBRIG, T. & LANG, V. (1958). Vergleichende Untersuchungen über BCG-Test und Tuberkulinproben bei Rindern. [**Comparative research on the BCG-test and the tuberculin test in cattle.**]—*Arch. exp. VetMed.* **12**, 870-883. **2326**

The tuberculin test was positive in 80, doubtful in 16 and negative in 41, and the B.C.G. test positive in 76, doubtful in 26 and negative in 35 of 137 cattle, tested simultaneously by both methods. 14 B.C.G. reactors failed to react to tuberculin and 18 tuberculin reactors gave negative B.C.G. tests. Results of both tests agreed in 95 cattle. Cattle in the pre-allergic stage did not react to B.C.G. Details were also given of results obtained in 97 cattle with four different types of tuberculin and B.C.G. It was concluded that the tuberculin test was superior to the B.C.G. test.—E.G.

ROMAGNOLI, A. (1958). Sulle cosidette — skin lesions. Rassegna sintetico-bibliografica con osservazioni personali. [**Skin lesions and tuberculosis in cattle.**] — *Zooprofilassi* **13**, 751-808. [Summaries in English and French.] **2327**

Research on the subject is reviewed and the aetiology, clinical manifestations, gross appearance, histology and skin reaction to tuberculin are discussed. An account of skin nodules in two cows is given.—T.E.G.R.

LA PLACA, M. & MORA, A. (1959). Sulla presenza del *Mycobacterium tuberculosis* nelle carni di bovini infetti. [*Mycobacterium tuberculosis* **in the flesh of tuberculous cattle.**] — *Zooprofilassi* **14**, 31-45. [Summary in English.] **2328**

Myobacterium tuberculosis was demonstrated in the muscular tissue of 15 of 18 affected carcasses passed as provisionally fit and 11 of 30 affected carcasses passed as fit for human consumption.—T.E.G.R.

KLEIN, H. & HAASE, H. (1958). Zur Diagnose, epizootologischen Bedeutung und fleischbeschaulichen Beurteilung der Tuberkulose des Schafes. [**Diagnosis, epidemiology and meat inspection aspects of tuberculosis in sheep.**]—*Mh. VetMed.* **13**, 618-622. **2329**

The i/d tuberculin test was performed on 1,414 Merino sheep (15 rams 3–10 years old; 505 ewes 2–10 years; 347 yearlings; and 547 lambs about 6 months old). The anal fold was a better site than the shoulder, positive reactions being clearer and easier to read. Between 72 and 96 hours after injection was the best time for reading the reactions. An increase in skin thickness of less than 2·5 mm. was regarded as negative; 2·5 to 5 mm. as doubtful; and over 5 mm. as positive. Pain was not a prominent feature, but the area felt consistently firm or doughy. Results were 16 positive; 14 doubtful; the rest negative. All except one of the positive and all except two of the doubtful reactions were in sheep over two years old. A re-test of 1 doubtful and 6 positive reactors 6 weeks later gave conflicting results. At meat inspection the possibility of pulmonary TB. in sheep over 2 years should be kept in mind and the pulmonary lymph nodes incised in several places. TB. in sheep is not so infectious as in cattle, and they are not regarded as the source of TB. in cattle on attested farms.—W. K. Dunscombe.

Francetić, M., Tunkl, B., Medanić, B. & Hadžihalilović, F. (1958). Važnost pravilnog pregleda limfnih čvorova svinja pri pregledu mesa i prilog poznavanju raširenosti tuberkuloznih infekcija svinja. **[Importance of examination of lymph nodes during meat inspection with reference to tuberculosis in pigs.]**—*Vet. Arhiv.* **28,** 295-304. [In Croat. Summaries in English and French.] **2330**

Lesions like those of TB. were found in lymph nodes from 249 of 2,159 slaughtered pigs. Tubercle bacilli were isolated in 55 of 157 of these cases. *Corynebact. equi* was isolated from mandibular lymph nodes from 12 of 597 pigs; other bacteria isolated were listed.—R.M.

Cavrini, C. & Parmeggiani, A. (1959). Saggi sulla prova allergica e sulla prova di agglutinazione nella tubercolosi aviaria. **[The tuberculin and agglutination tests in avian tuberculosis.]** — *Vet. ital.* **10,** 3-16. [Summaries in English, French and German.] **2331**

For an accurate assessment of the flock incidence of TB. it is considered that the tuberculin test should be repeated after 48 and 72 hours, in the case of non-reactors. Whole blood and serum samples from experimentally infected birds were subjected to rapid agglutination tests with antigens prepared from 7 strains of *M. tuberculosis;* results were either negative or inconclusive, whereas positive reactions were obtained with the tuberculin test.—T.E.G.R.

Nassal, J. (1958). Vorzugsmilch und Geflügeltuberkulose. **[Avian tubercle bacilli in T.T. milk.]** — *Rindertuberk. u. Brucellose* **7,** 94-102. **2332**

Culture of a bulk sample of milk from an attested herd yielded tubercle bacilli of the avian type. None of the cows reacted to mammalian and avian tuberculins, and individual milk samples were negative. Contamination of the milk before leaving the farm was suspected. In a second herd, avian type tubercle bacilli were isolated from the intestinal lymph node of one of two cows giving a doubtful tuberculin reaction. On 5 of 7 attested farms TB. was demonstrated in the fowls. It is proposed that fowls on attested farms should undergo the tuberculin test annually, and that individual, not bulk, milk samples should be routinely tested.

—M.G.G.

Johanovský, J. (1959). **Demonstration of endogenous pyrogen in serum during systemic tuberculin reaction in rabbits.** — *Nature, Lond.* **183,** 693-694. **2333**

An endogenous pyrogen was formed by a reaction between a small amount of purified tuberculin and cells of hypersensitive rabbits, both in actively sensitized rabbits and after transfer of hypersensitive cells into normal rabbits.—M.G.G.

Lurie, M. B., Zappasodi, P., Levy, R. S. & Blaker, R. G. (1959). **On the role of the thyroid in native resistance to tuberculosis. I. The effect of hyperthyroidism. II. The effect of hypothyroidism, The mode of action of thyroid hormones.** — *Amer. Rev. Tuberc.* **79,** 152-179 & 180-203. [Summaries in French and Spanish.] **2334**

Hyperthyroidism, by greatly inhibiting the growth of tubercle bacilli, enhanced resistance in inbred rabbits and restricted caseation. Hypothyroidism reduced resistance.—R.M.

Berthrong, M. & Hamilton, M. A. (1959). **Tissue culture studies on resistance in tuberculosis. II. Monocytes from normal and immunized guinea pigs infected with virulent human tubercle bacilli.**—*Amer. Rev. Tuberc.* **79,** 221-231. [Summaries in French and Spanish.] **2335**

Monocytes from immune animals have an apparent ability to restrict the intracellular multiplication of virulent tubercle bacilli which leads to the development of intracellular cords, solid bacterial masses, or burst cells. This resistance was relative to control cells, not a complete immunity.—R.M.

COHN, M. L., DAVIS, C. L. & MIDDLEBROOK, G. (1958). **Airborne immunization against tuberculosis.** — *Science* **128,** 1282-1283. [Authors' abst. modified.] **2336**

Inhalation of very small numbers of living attenuated B.C.G. and their multiplication in g.pigs induce resistance against airborne infection with virulent tubercle bacilli. Different strains of B.C.G. differ in capacity to immunize by this means.

TOLHURST, J. C., BUCKLE, G. & WELLINGTON, N. A. M. (1959). **The experimental infection of calves with *Mycobacterium ulcerans*.**—*J. Hyg., Camb.* **57,** 47-56. [Authors' summary modified.] **2337**

Skin lesions with histopathology similar to that seen in lesions in man have been produced in calves by the experimental inoculation of cultures of *Mycobact. ulcerans*. Sensitization of infected calves to mammalian tuberculin as well as to "ulceranin" has been demonstrated.

It is considered unlikely that cattle are a reservoir of infection for man.

MANKIEWICZ, E. (1958). **Agar diffusion precipitation and complement fixation tests applied to the study of the antigenic relationships between chromogenic acid-fast bacteria and *Mycobacterium tuberculosis*.** — *Canad. J. Microbiol.* **4,** 565-570. **2338**

Agar diffusion precipitation and complement-fixation tests on 42 strains of chromogenic acid-fast bacilli obtained from human sources enabled their classification as (a) related to virulent mycobacteria (*M. tuberculosis*), (b) related to saprophytic mycobacteria (*M. phlei*), and (c) apparently related to both the former and the latter in some respects, or to other chromogenic bacteria only. These tests clearly show that the antigens of typical and atypical tubercle bacilli, on the one hand, and of saprophytic mycobacteria, on the other hand, overlap.

—C. L'ECUYER.

CUNNINGHAM, M. P. & GILMOUR, N. J. L. (1959). **A new method of preparing smears of bovine faeces for microscopical examination in the diagnosis of Johne's disease.** — *Vet. Rec.* **71,** 47-48 & 49. **2339**

Bovine faeces of gruel consistency sufficient to cover 2 sq. cm. to a depth of 0·25 cm. is placed on a slide. After 5 min. the long edge of another slide is placed at right angles on the first slide and the faeces spread along the junction. The second slide is then lifted cleanly leaving a straight edge of faecal fluid. After drying slowly and staining by the Ziehl Neelsen method, the straight edge is examined. Compared with the direct smear and centrifugation methods, this method enables *Mycobacterium johnei* bacilli to be found more quickly and in greater numbers.—A. ACKROYD.

CHANDLER, R. L. (1959). **Observations on the incidence of infection with *Mycobacterium johnei* in calves.** — *Vet. Rec.* **71,** 147. [Author's summary modified.] **2340**

The ileocaecal lymph nodes of 447 calves were examined for *M. johnei*. Organisms resembling *M. johnei* were recovered from only 2 calves. The significance of this result is discussed.

ALBORNOZ, J. E. (1957). Tratamiento de la enfermedad de Johne (paratuberculosis bovina) por la promanida, el OM 32, el tetrationato de sodio y la difenasona. **[Treatment of Johne's disease with glucosulphone and other drugs.]** — *Rev. Fac. Med. vet., Bogota* **21,** 585-589. **2341**

Acid-fast bacilli were identified in faeces from a 4-year-old cow with diarrhoea. This animal made an apparent recovery when treated with glucosulphone sodium ("Promin" or "Promanide"). This drug was inj. i/v in 10 g. doses 6 days a week for 3 weeks. Symptomatic treatment with astringents, minerals and vitamin B_{12} was continued for 6 months. At the end of this period the cow had apparently recovered and was mated; diarrhoea did not recur during pregnancy. It was stated that 6 other cases were treated with glucosulphone, with favourable results. Treatment with a combination of glucosulphone and sodium trithionate ("OM32") or sodium tetrathionate, and with dapsone was reported but details are lacking.—R.M.

AGRIMI, P., D'ASCANI, E. & TOZZINI, F. (1959). Su vari episodi di infezioni genitali nei bovini sostenute da *Corynebacterium pyogenes* bovis. **[*Corynebacterium pyogenes* infection of the genital system in cattle.]**—*Zooprofilassi* **14,** 5-16. [Summaries in English, French and German.] **2342**

An account is given of *C. pyogenes* infection of the genital tract in 54 cows after service by two infected bulls and in 55 cows at parturition. Irrigation with Lugol's soln. gave good results. The organism was isolated from the stomachs and brains of aborted foetuses. The role of *C. pyogenes* infection in sterility is discussed.

—T.E.G.R.

WOLF, B. & STAVITSKY, A. B. (1958). *In vitro* **production of diphtheria antitoxin by tissues of immunized animals. II. Development of a synthetic medium which promotes antibody synthesis and the incorporation of radioactive amino acids into antibody.**—*J. Immunol.* **81,** 404-413. **2343**

In previous studies evidence was presented for *de novo* synthesis of diphtheria antitoxin when lymphoid tissues from immunized rabbits were incubated *in vitro* in a suitable medium. Further data indicated that antibody synthesis required amino-acids rather than more complex polypeptide or protein precursors. The purpose of the present investigation was to examine a number of nutritional factors which might influence *in vitro* antibody formation by immunized tissues.

CIORTEA, G., MARCEA, E., NIŢOIU, I. & BÎRZU, I. (1958). Incercări de imbunătăţire a activităţii revelatoare şi a specificităţii maleinei, prin cultivarea bacilului morvei pe medii nutritive noi. [**Improvement of the diagnostic value and specificity of mallein by culture of the glanders bacillus on new media.**]—*Lucr. ştiinţ. Inst. Pasteur, Bucureşti* **3,** 365-379. [In Roumanian. Summaries in French, German and Russian.] **2344**

Specificity of mallein was improved by growing *Pfeifferella mallei* on a medium consisting of equal proportions of glycerin peptone broth, Sauton's medium containing 0·4 g.% of citric acid, and brewers' yeast, or on a medium consisting of equal proportions of glycerin peptone broth, Sauton's medium containing asparagine, and yeast, or on a combination of equal parts of glycerin peptone broth and yeast, or on a combination of equal parts of glycerin peptone broth, Sauton's medium containing 0·8 g.% of citric acid, and Sauton's medium containing succinic acid instead of asparagine.—E.G.

SCHMITTDIEL, E. (1958). Über den Einfluss von anorganischem Eisen und pantothensaurem Calzium auf die Vermehrung und die immunisierenden Eigenschaften von Erysipelothrix rhusiopathiae, geprüft an der Rotlauf-Formol-Adsorbatvakzine. [**Influence of iron and calcium pantothenate on growth and immunizing properties of vaccine strains of** *E. rhusiopathiae.*]—*Inaug. Diss. Giessen* pp. 27. **2345**

E. rhusiopathiae grew better on horse meat lactose peptone broth with 10% horse serum when 50 mg.% calcium pantothenate or 20 or 25 μg.% ferrous sulphate were added. It did not grow so well when the iron content was reduced to 10μg.% with calcium chloride soln. The immunogenic quality of formolized adsorbate vaccines prepared from both whole cultures and culture filtrates were tested in mice. It was not improved by the calcium pantothenate or the ferrous sulphate, and was weakened by reducing the iron content to 10μg.%.—M.G.G.

PLASHKE, W. (1959). Eine Schnellmethode zur Unterscheidung zwischen Rotlaufbakterien und Listerien. [**Rapid method for distinguishing** *E. rhusiopathiae* **from** *E. monocytogenes.*] — *Arch. Lebensmittelhyg.* **10,** 60-61. **2346**

P. tried the test described by Il'ina [*Veterinariya, Moscow* No. 10, p. 71, 1957], which is based on the decolorization of a broth containing methylene blue and neutral red by *E. monocytogenes* but not by *E. rhusiopathiae.* The test gave good results with 33 stock strains of the bacteria. Decolorization occurred not after 4 hours incubation as stated by Il'ina, but after 18 hours.—R.M.

BIBERSTEIN, E. L. & KENNEDY, P. C. (1959). **Septicemic pasteurellosis in lambs.**—*Amer. J. vet. Res.* **20,** 94-101. **2347**

Bacteriological and pathological observations are described on 6 outbreaks of a *Pasteurella haemolytica* septicaemia in feeder lambs in 1957 in California. The outbreaks were similar to those described by Stamp *et al.* in Scotland. Fatal infection was produced in pigs and mice by intraperitoneal and intracardial inoculation of the organism whilst in lambs, mild to peracute and chronic forms were produced by intravenous inoculation. Pneumonia comparable with the field condition associated with shipping fever was not encountered experimentally. The isolation of a colonial variant from 3 experimentally infected lambs and the demonstration of cultural differences between pathogenic strains and isolates from the upper respiratory tract of healthy sheep suggests that characteristics of the organism as well as host factors are involved in the pathogenesis of septicaemic pasteurellosis.—A. ACKROYD.

EDWARDS, B. L. (1959). **A note on haemorrhagic septicaemia in neonatal pigs.** — *Vet. Rec.* **71,** 208. [Author's summary modified.] **2348**

A condition in new-born pigs was characterized P.M. by serous effusions and haemorrhages and was associated with the recovery in almost pure culture of an unusual strain of *Pasteurella.*

JOUBERT, L. & OUDAR, J. (1958). La pseudotuberculose latente du cobaye d'élevage et les erreurs du diagnostic expérimental. **[Latent pseudotuberculosis in guinea-pigs as a cause of erroneous diagnosis of tuberculosis.]**—*Bull. Soc. Sci. vét. Lyon* **60**, 119-124. **2349**

A stain of *Past. pseudotuberculosis* of rare antigenic type (Thal's type 5) infected spontaneously the colony of 100 g.pigs in a sanatorium. The infection, causing tuberculoid lesions and non-specific reactions, led to the erroneous diagnosis of active TB. in convalescing patients.—M.G.G.

OSBORNE, J. C., MOCHRIE, R. D. & BATTE, E. G. (1959). **Microbiological and therapeutic aspects in calf enteritis.**—*J. Amer. vet. med. Ass.* **134**, 173-177. **2350**

Escherichia spp. were isolated from 37 of 38 samples of faeces from scouring calves, and from the spleen of 10 of 15 calves that died. Most were sensitive *in vitro* to 4 nitrofurans and several antibiotics. Scours ceased within 5 days in 15 of 21 calves given neomycin and in 18 of 21 given nifuraldezone.—M.G.G.

TERLECKI, S. & SHAW, W. B. (1959). ***Escherichia coli* infection in lambs.** — *Vet. Rec.* **71**, 181-182. [Authors' summary modified.] **2351**

An outbreak in young lambs is described. Purulent meningo-encephalitis was found in two. One also had generalized infection with fibrinopurulent arthritis. In the other, lesions were confined almost entirely to the central nervous system. *E. coli* was isolated from both. It was rapidly lethal for rabbits by i/v inoculation, but caused only transient pyrexia in 4 lambs 3 months old inoculated by the same route. Possible factors associated with natural immunity are discussed.

KELEN, A. E. (1958). **Production of OB diagnostic antisera from motile *Escherichia coli* strains.** — *Canad. J. Microbiol.* **4**, 581-591. **2352**

Using homologous H agglutinins and/or phenol, H-inagglutinable "variants" were produced from motile *E. coli* strains and from these OB suspensions were prepared. Rabbits immunized with these suspensions yielded antisera which met the requirements of *E. coli* OB diagnostic antisera. The characteristics of the experimental antisera prepared are discussed briefly, and some advantages of the methods presented over others commonly used in laboratory practice are indicated.—C. L'ECUYER.

TERPSTRA, J. I. (1958). Haemolytische colibacteriën als oorzaak van ziekte bij het varken. **[Haemolytic coli bacteria as a cause of disease in pigs.]**—*Tijdschr. Diergeneesk.* **83**, 1078-1088. [In Dutch. Summaries in English, French and German.] **2353**

During a year haemolytic *E. coli* were isolated from 20 of 25 pigs with oedema disease ("slingerziekte"), 5 of 6 with mulberry heart disease, 34 of 102 with gastro-enteritis, and 8 of 197 pigs with other disorders. The serological type of 46 of the strains isolated was determined and the types were found to be similar to those isolated from pigs in the United Kingdom.

—R.M.

HARMS, F. (1959). Salmonellen-Dauerausscheider und Milchhygiene. **[Bovine salmonella carriers and milk hygiene.]**—*Dtsch. tierärztl. Wschr.* **66**, 131-133. [Summary in English.] **2354**

Twelve milk samples were taken aseptically from 2 cows with latent salmonellosis. None yielded salmonella. But of 39 samples obtained by the usual hand-milking technique without disinfection of the udder, 14 contained *S. dublin*. Of 257 samples taken over a period of 18 months from a dairy herd containing several carriers of salmonella infection, 7 yielded salmonella. It is concluded that salmonella is not excreted in the milk, but may contaminate it during milking.—M.G.G.

NEWELL, K. W., MCCLARIN, R., MURDOCK, C. R., MACDONALD, W. N. & HUTCHINSON, H. L. (1959). **Salmonellosis in Northern Ireland, with special reference to pigs and salmonella-contaminated pig meal.**—*J. Hyg., Camb.* **57**, 92-105. [Authors' summary modified.] **2355**

Caecal swabs from 489 pigs killed in two bacon factories showed a salmonella isolation rate of 2%.

Salmonella organisms were isolated from 23 out of 100 samples of caecal faeces and from only 6 of 100 caecal swabs taken from the same animals. 3% of meat samples from these pigs and 70% of sausage samples from the meat contained salmonella.

Salmonella were present in 9% of rectal swabs from 162 pigs on five farms producing infected pigs.

24% of pig-meal samples taken on these farms contained salmonella, and the same types were found in the meal at the mill and in fish meal and bone meal before mixing.

It is probable that some salmonella types pass from feedstuffs through pigs to human food and cause human infections.

UHERKO, J. (1959). Epidemiológia a epizootológia salmonelóz osobitným zretel'om na salmonelózu *bareilly*. **[Salmonellosis in man and animals in Czechoslovakia, with special reference to** *S. bareilly*.**]**—*Vet. Čas.* **8,** 84-93. [In Slovak. Summaries in English, French, German and Russian.] **2356**

Of 45 human patients with *Salmonella bareilly* infection, 26 were infected by eating raw or partly cooked eggs or egg products, and 10 from pork, sausages or tinned meat. In the remainder the source was untraceable. Incidence of salmonellosis in man and animals in Czechoslovakia, and its epidemiology and prevention, were discussed.—E.G.

MONTEVERDE, J. J. (1956/58). Salmonelosis en roedores debida a Salmonella enteritidis var. danysz. **[***Salmonella enteritidis* **infection in a colony of white rats.]**—*Rev. Med. vet., B. Aires* **38,** 145-150; 153-157 & **39,** 15-20. **2357**

About 900 of a colony of 4,000 rats died during an outbreak caused by the *danysz* variety of *S. enteritidis*. An unusual feature was localization of infection to the eye of rats which had been inoculated with autogenous vaccine. The outbreak was controlled within 2 months by hygienic measures and vaccination. Chemotherapy gave poor results.—R.M.

GUBKIN, S. M. (1958). **[Survival of** *Salmonella enteritidis* **in soil.]**—*Trud. Mosk. vet. Akad.* **23,** 75-79. [In Russian.] **2358**

The duration of survival of the organisms varied with climate, type of soil and type of vegetation, but average figures for summer were 72 days on the surface and 104 days at a depth of 20 cm.—R.M.

PRZYJAŁKOWSKI, Z. (1958). **Investigations on the transmission of** *Salmonella typhimurium* **in animals by migrating nematode larvae.**—*Bull. Acad. polon. Ser. Sci. biol.* **6,** 383-388. [In English.] **2359**

Of 23 mice fed a subinfective dose of *S. typhi-murium* together with 3,000 pig ascaris larvae, 4 developed bacteraemia on the 7th day or later and *S. typhi-murium* was isolated from the liver and spleen of 2 others. Of 23 control mice given salmonella alone, one developed bacteraemia. A similar experiment was made with *Trichinella spiralis*. Of 16 mice fed the subinfective dose together with *T. spiralis* larvae 4 developed bacteraemia, compared with 2 of 16 control mice given only salmonella. *S. typhimurium* could not be isolated from pig ascaris larvae recovered from lymph nodes and lungs nor from *T. spiralis* cysts of infected mice. Six mice were fed a sublethal dose of *S. typhimurium* and, 2 weeks later, 4,000 ascaris larvae. Five developed bacteraemia. These results indicate that nematode larvae may assist bacterial infection and lower resistance to it, but are not themselves infected.—M.G.G.

WATANABE, S., NAMIOKA, S., NAGAI, T. & SAKAZAKI, R. (1958). **[Studies of** *Salmonella* **infection in hen's eggs during incubation with special reference to the mode of infection with** *S. pullorum* **and** *S. senftenberg*. **I. Survival period of chick embryos as related to the type and site of isolation of** *Salmonella*.**]** — *Bull. Nat. Inst. Anim. Hlth, Tokyo* No. 35. pp. 29-36. [In Japanese. Summary in English.] **2360**

Cultures were made from 280 infertile hens' eggs and 1,528 dead chick embryos. Four salmonella types were isolated from 44 dead embryos that had been incubated for more than 5 days. *S. pullorum* was recovered from the yolk of 13, from the shell membrane of 10, and from both yolk and shell membrane of 10. *S. senftenberg* was isolated from the shell membrane of 3, and from the shell membrane, chorioallantoic fluid and yolk of 6, but not from the yolk only. *S. cholerae-suis* and *S. paratyphi B* were each isolated from the shell membrane of one. It is considered that *S. pullorum* infected eggs by 2 routes, the yolk, before laying, and the shell, during incubation, and *S. senftenberg* the shell only. It was established also that *S. pullorum* survived in the yolk of incubated eggs without multiplying, which suggests the presence of an inhibitory factor in yolk.—M.G.G.

ISHII, F., SAKAZAKI, R. & URUSHIDO, M. (1958). **Distinction of** *Salmonella gallinarum* **and** *S. pullorum*. — *Bull. Nat. Inst. Anim. Hlth, Tokyo* No. 35. pp. 21-27. [In English. Summary in Jananese pp. 19-20. Authors' English summary modified.] **2361**

Cultural, biochemical and serological properties were examined in 225 non-motile strains of *Salmonella* Group D isolated from chickens. If *S. pullorum* and *S. gallinarum* were considered as two distinct types, then the characteristics differentiating them seemed inconsistent and variable. The epidemiological distinction emphasized by earlier workers was not confirmed. It is against the rule of classification of enteric bacteria to divide organisms into types biochemically. Therefore, it is recommended, as

stated by Kauffmann, that the organisms be classified as a single type, "*S. gallinarum-pullorum*", which can be divided into biochemical types that do not have special names.

LINSERT, H. (1958). Salmonellenfunde bei Schlachtenten. [**Salmonella in slaughtered ducks.**] — *Arch. Lebensmittelhyg.* **10,** 25-26. **2362**

S. typhi-murium was isolated from the bile in 12 of 352 ducks slaughtered for human consumption.—R.M.

HAUSER, K. W. (1959). Die Salmonellosis der Tauben. [**Salmonellosis in pigeons.**]—*Berl. Münch. tierärztl. Wschr.* **72,** 126-129. [Summary in English.] **2363**

Of 6,883 samples of material (faeces, dead birds, and organs) obtained from 2,411 pigeon flocks, 1,133 samples from 422 flocks (17·5%) yielded salmonella. *S. typhi-murium* was isolated 1,126 times, *S. montevideo* 4 times, *S. dublin* twice, and *S. canoga* once. There is no reliable method of treating infected flocks; for individual birds oxytetracycline perorally is recommended. —M.G.G.

LIEBERMAN, R., EARLE, H., IKARI, N. & MCCULLOUGH, N. B. (1959). **Immunity afforded by specifically absorbed, unabsorbed and combinations of salmonella antisera.**—*J. Immunol.* **82,** 52-61. [Authors' summary modified.] **2364**

Employing *Salmonella typhi-murium* and *S. enteritidis,* and their respective absorbed, or unabsorbed immune sera, in mouse protection tests, the relationship of antibody components in conferring protection was investigated by altering an immune serum so that only one reactive component remained, and by quantitatively increasing a component in both unheated and inactivated immune sera.

An absorbed serum containing only antibody to somatic antigen 9 gave greater protection than the unabsorbed immune serum. Enhancement of protection occurred when a single antibody component, 12_1, 12_2 was increased in amount in mixtures of the two immune sera. This increase of protection was independent of complement. The degree of enhancement and the degree of protection was not the same in all experiments and depended upon more than the interactions of the 12_1, 12_2 components present.

BACZYŃSKI, E. & SZAFLARSKI, J. (1959). Zatrucie pokarmowe u ludzi wywołane przez *S. cholerae-suis* Kunzendorf. [*Salmonella cholerae-suis* **var. kunzendorf as cause of food poisoning in man.**]—*Med. Wet., Warszawa* **15,** 26-27. **2365**

An account of an outbreak in which 4 families (19 people 1–40 years old) became ill after eating pork and ham from pigs known to have come from a herd infected with *S. cholerae-suis* var. kunzendorf. The clinical symptoms, which generally appeared within 6–24 hours after consumption of the infected meat, were headache, diarrhoea, vomiting, fever and in one case convulsions and loss of consciousness. Recovery took 3–4 days.—M. GITTER.

KERR, W. R. & RANKIN, J. E. F. (1959). **The spread of brucellosis within herds—the milk problem.**—*Vet. Rec.* **71,** 224. **2366**

It was demonstrated that in vaccinated herds *Br. abortus* may be spread from an infected cow to other cows by milking. Vaccinated cows exposed to the organisms by milking with hands bathed in infected milk began to excrete the organisms in the milk 14 days after first exposure. Blood titres became positive. In a vaccinated herd of 36 cows, with no classical brucella abortions, 20 had to be culled because of udder infection.—M.G.G.

BÜRKI, F. (1958). Die Differenzierung von Impftitern und Infektionstitern beim Rinderabortus Bang. [**Differentiation of vaccine titres and infection titres in bovine brucellosis.**] — *Schweiz. Arch. Tierheilk.* **100,** 439-449. [Summaries in English, French and Italian.] **2367**

Serum samples from cattle immunized with Strain 19, from cows which had recently aborted and from cows with positive and negative whey tests, were examined by tube agglutination, complement fixation, precipitation and Coombs test. By the agglutination test alone it was impossible to distinguish between natural infection and vaccination titres, but by the combined use of all four tests differentiation was possible in most cases. Details were given of a trial examination in a herd of infected and of vaccinated cattle.—E.G.

VAN WAVEREN, G. M. (1958). Diagnostic des brucelloses animales. La standardisation par la séro-agglutination. [**Diagnosis of brucellosis in animals. Standardization of the serum agglutination test.**]—*Bull. Off. int. Epiz.* **50,** May. pp. 144-157. [Summaries in English and German.] **2368**

The importance of standardizing the agglutination test and its interpretation is

emphasized and it is suggested that: the optimal bacterial concentration should be assessed with 75% clarification as the criterion; the number of strains for antigen production should be limited; and the titre which is to be taken as positive should be lowered in order to achieve greater sensitivity.—T.E.G.R.

VAN DRIMMELEN, G. C. (1958). **Strain 19 brucella vaccine: V. Mass production in the *Brucella* Vortex Aerated culture apparatus.**—*Onderstepoort J. vet. Res.* **27**, 539-547. [Author's abst.] **2369**

Description of a method used for the production of brucella vaccine cultures of 72 litres in a Vortex Aerated apparatus of 250 litre capacity is given. The vaccine is produced by the batch process by which a harvest of more than 10^{16} viable cells is obtained in 48–70 hours. This is the equivalent of 120,000 doses of liquid vaccine per batch. If concentrated by sedimentation of the cells with sodium-carboxy-methyl-cellulose and used for freeze-dried vaccine, an output of 50,000 doses per week can be maintained.

WITTIG, W. (1959). Zur Technik und Zuverlässigkeit der Komplementbindungsreaktion bei der Brucellose der Schweine. [**Technique and reliability of the complement-fixation reaction in porcine brucellosis.**] — *Berl. Münch. tierärztl. Wschr.* **72**, 131-134. [Summary in English.] **2370**

Sera from 23 pigs were inactivated at 56°C. and submitted to the c.f. test for brucellosis. Normal haemolysins in the sera caused haemolysis. The activation temp. was raised, therefore, to 62°C. With this method the c.f. test proved superior to the slow agglutination test. Of 43 sera from infected herds 13 were positive and 11 doubtful to the slow agglutination test whereas 29 were positive and all except one doubtful to the c.f. test. All positive and all except one doubtful sera in the slow agglutination test were positive in the c.f. test. In routine diagnosis inactivation at 62°C. for half an hour is recommended.—M.G.G.

ALTON, G. G. (1959). **Brucellosis in Malta.**—*Brit. vet. J.* **115**, 96-99. [Author's summary modified.] **2371**

In Malta it is estimated that there are between 300 and 400 infected dairy cattle in about 100 infected herds, two-thirds of the herds being infected with *Br. abortus* and a third with *Br. melitensis*. About 20% of all goats and 1% of all sheep and pigs are infected with *Br. melitensis*, the only species of brucella so far isolated from them. A campaign for the control of brucellosis in cattle and goats is in progress. Reacting cattle are slaughtered, and goats are vaccinated.

STRAUCH, D. & NITZSCHKE, E. (1958). Untersuchungen über die therapeutische Wirkung von Penicillin, Oxytetracyclin und Pyrrolidino-methyl-tetracyclin (=Reverin) auf die experimentelle Brucella melitensis-Infektion bei Kaninchen. [**Treatment of experimental *Br. melitensis* infection in rabbits with penicillin, oxytetracycline and pyrrolidino-methyltetracycline.**] — *Ärztl. Forsch.* **12**, 513-516. **2372**

Treatment commenced 10 days after i/v inj. of 30 x 10^9 organisms of *Br. melitensis* and lasted for 21 days. The rabbits were killed for bacteriological examination 7 days after the end of treatment. The bacteriological findings in penicillin-treated animals differed little from those in untreated controls. Oxytetracycline killed the organisms at 10 mg./kg. body wt. daily, but not at 5 mg./kg. The new preparation pyrrolidino-methyltetracycline ("Reverin") proved bactericidal when administered i/v or i/m at 5 mg./kg. and therefore appeared to be suitable for the treatment of brucellosis.—R.M.

I. AIRAPETYAN, V. G., KHACHATRYAN, A. B., POGOSYAN, A. A. & MARTIROSYAN, G. G. (1956). [**Experimental tularaemia in sheep.**] — *Trud. Armyan. nauchno-issled. Inst. Zhivotnovodstvo i Veterinarii* **1**, Ser. Vet. No. 9. pp. 63-80. [In Russian.] **2373**

II. POGOSYAN, A. A. (1956). [**Clinical and haematological studies of experimental tularaemia in sheep.**]—*Ibid.* pp. 81-84. [In Russian.] **2374**

I. Sheep were incriminated as the source of tularaemia in human beings in Armenia, and as a result an investigation was made of diagnostic methods suitable for sheep. It was found that only agglutinin titres of 1:200 and higher could be accepted as evidence of infection. Agglutinin titres dropped sharply 15–30 days after infection. Intradermal tests with "tularin", and c.f. tests, gave unreliable results when compared with agglutination tests on 1,500 sheep. Tularaemia organisms disappeared from sheep about 15 days after infection: the chronic carrier state did not appear to exist.

II. 15 sheep were inoculated s/c with up to 5,000 million organisms of *Br. tularensis*. The incubation period was 12–24 hours. Symptoms were similar to those described by other authors. The main change in the blood was increase in number of leucocytes.—R.M.

TSŸRO, A. I. & KONOVALOVA, A. G. (1957). **[Study of cultures of brucella isolated from experimentally infected fowls.]**—*Trud. Omsk vet. Inst.* **15**, 88-99. [In Russian.] **2375**

The authors studied biochemical and serological properties of 427 cultures of the three types of brucella isolated from blood or organs of experimentally infected fowls. It was concluded that prolonged sojourn of brucella in fowls caused changes in the cultural, biochemical and agglutinating properties and changes in sensitivity to bacteriostatic agents. The changes may have been caused by the high body temp. of fowls or by their different type of metabolism. —R.M.

BABUDIERI, B. & GASPARDIS, D. (1959). Ricerche sulla presenza ed il significato di anticorpi per le leptospire nei sieri di bovini. **[Leptospira antibodies in cattle.]** — *Zooprofilassi* **14**, 19-29. **2376**

Serum samples from 493 of 549 cattle agglutinated *L. icterohaemorrhagiae* at titres of 1 : 100 and over. Calves of cows with negative titres were also negative. Calves of dams with positive titres were positive at birth but became negative about one month later; occasionally they became positive again after some months. Low titre agglutination is discussed.—T.E.G.R.

KENZY, S. G., KEOWN, G. H., OKAZAKI, W., GILLESPIE, R. W. H. & RINGEN, L. M. (1958). **Detection of viable *L. pomona* in bovine kidneys after leptospiruria had apparently ceased.**—*Vet. Med.* **53**, 647-648. **2377**

Leptospires persisted in the kidneys 14 and 54 days after leptospiruria had ceased in 2 of 5 calves. Tissue cultures were set up with 1 : 50, 1 : 500 and 1 : 5,000 suspensions of kidney tissue. In the two positive cases, leptospires multiplied in the 1 : 5,000 dilution but not in the lower dilutions. Inoculation of hamsters with kidney suspension failed to reveal the organisms. Agglutinins were demonstrated in the kidneys of some calves; the apparent influence of such antibodies on the recovery of leptospires was discussed.—R.M.

HEPPLE, J. R., CHODNIK, K. S. & PRICE, E. K. (1959). **Immunisation of lambs against *Clostridium welchii* type D enterotoxaemia (pulpy kidney disease).** — *Vet. Rec.* **71**, 144. **2378**

Taking 0·2 units of *Cl. welchii* ε antitoxin per ml. of serum as the minimum indication of immunity, lambs of ewes inoculated during pregnancy with a purified *Cl. welchii* Type D aluminium hydroxide-treated toxoid showed immunity at birth and 5 weeks later. Subsequently, untreated lambs lost their immunity at 9–15 weeks old. Lambs inoculated at 5 weeks old with 2 ml. of toxoid began to lose their immunity at 15 weeks old but those given a second injection 4 weeks after the first were still immune.—A. ACKROYD.

FIELD, H. I. & GOODWIN, R. F. W. (1959). **The experimental reproduction of enterotoxaemia in piglets.** — *J. Hyg., Camb.* **57**, 81-91. [Authors' summary modified.] **2379**

Whole cultures of *Clostridium welchii*, Type C, produced enterotoxaemia and death when fed to new-born piglets.

Piglets dying from enterotoxaemia induced by bacteria-free toxin showed all the extensive pathological changes of the natural disease; their intestines contained Type C organisms and far greater quantities of toxin than had been given by mouth.

Type C organisms could not be demonstrated in the intestines of piglets from healthy litters of the same age, although such animals were carriers of Type A.

The clinical signs, with particular reference to the development of hypoglycaemia, and the pathology of both natural and experimentally induced cases of enterotoxaemia are described.

In the light of these findings the pathogenesis and epidemiology of enterotoxaemia in the piglet are discussed.

I. BEERENS, H. & DELCOURTE, F. (1958). Caractère différentiel entre *Clostridium perfringens* fécal et tellurique. **[Differentiation between *Cl. welchii* from faeces and soil.]**—*Ann. Inst. Pasteur* **95**, 739-740. [Summary in English.] **2380**

II. BEERENS, H. & DELCOURTE, F. (1958). Action des sels minéraux dans la différenciation des souches telluriques et fécales de *Clostridium perfringens*. **[Action of mineral salts in the differentiation between *Cl. welchii* from faeces and soil.]**—*Ibid.* 740-742. [Summary in English.] **2381**

I. & II. The authors demonstrated a difference between strains of *Clostridium welchii* of either faecal or soil origin by means of resistance of cultures to a 20% saline soln. Those of faecal origin were killed, those from soil resisted saline. —E.G.

ISPOLATOVSKAYA, M. V., BLAGOVESHCHENSKIĬ, V. A., VLASOVA, E. V. & KUZ'MINA, A. P. (1959). **[Electrophoretic and immunochemical study of *Cl. oedematiens* toxoid.]**—*J.*

Microbiol., Moscow **30**, No. 1. pp. 54-58. [In Russian.] **2382**

Paper electrophoresis revealed the presence of 3–4 protein components in the toxoid. Agar diffusion precipitin tests revealed 5–7 antigens. Purification did not change the number of protein components or the precipitin zones. A high degree of purity could be achieved by electrophoretic fractionation in a starch column.—R.M.

BORISOVA, L. V. (1959). [**Use of chick embryos for determining the virulence of *Cl. septicum*.**] —*J. Microbiol., Moscow* **30**, No. 1. pp. 77-81. [In Russian.] **2383**

Chick embryos were much more susceptible to 4 strains of *Cl. septicum* than g.pigs or mice and could be used for determining virulence.

—R.M.

SURJÁN, M. (1959). **Large scale production of tetanus toxin. III. The production of highly potent and pure tetanus toxin.**—*Schweiz. Z. allg. Path.* **22**, 224-228. [In English. Summaries in French and German.] **2384**

S. used, with modifications, the cellophane dialysis method of Koch & Kaplan [*V.B.* **24**, 358].—R.M.

PHILIPSON, L. (1959). **Studies on the interaction between tetanus toxoid and antitoxin in simultaneously immunized guinea-pigs.** —*Acta path. microbiol. scand.* **45**, 203-212. [In English. Author's summary modified.] **2385**

The passive and active protection given to g.pigs by a single injection of toxoid–antitoxin was tested by challenge with toxin and by determination of the antitoxin concentration in the serum. The protection given by a booster dose 7 weeks after the first was studied also. Comparison with passively immunized controls showed a slight reduction in the passive protection 4 days after injection. The explanation of this is discussed. A reduction in both basal immunity and in the effect of a booster dose was demonstrated in experimental animals, compared with actively immunized controls but this may have been due to a low dose of toxoid.

BASSINI, E. (1959). La streptopenicillina nel tetano. (Considerazioni della pratica clinica). [**Treatment of tetanus with a combination of penicillin and dihydrostreptomycin.**]—*Progr. vet., Torino* **14**, 135-137. **2386**

A donkey, a horse and a cow with tetanus were successfully treated with antitetanus serum plus a combination of penicillin and dihydrostreptomycin.—T.E.G.R.

TE PUNGA, W. A. (1958). **An indirect haemagglutination test for the detection of *Vibrio fetus* antibodies. I. Development and properties of antigen. II. Detection of *Vibrio fetus* antibody in bovine vaginal mucus.**—*N. Z. vet. J.* **6**, 157-160 & 161-164. [Author's conclusions.] **2387**

I. Heating *V. fetus* cells renders them capable of modifying sheep erythrocytes, rendering them specifically agglutinable in the presence of *V. fetus* antibodies. Pre-treatment with 0·5 per cent. formalin before heat treatment reduces the erythrocyte-modifying capacity of *V. fetus* cells. Sheep erythrocytes, modified with material derived from *V. fetus* cells, are more sensitive indicators of the presence of *V. fetus* antibody in rabbit serum than bacterial agglutination tests.

II. Indirect haemagglutination tests were applied to the detection of antibodies in bovine vaginal mucus. Low dilutions of vaginal mucus give non-specific reactions owing to the physical nature of the mucus. Such non-specific reactions will prevent the detection of low levels of antibodies, but the masking effect can be removed by freezing and thawing the mucus samples before testing. The indirect haemagglutination test will detect lower levels of antibody than the bacterial agglutination test. Antibodies can be detected at an earlier stage of an infection, and more consistently, than by the *V. fetus* agglutination test.

JACOTOT, H., LEVADITI, J. & VALLÉE, A. (1959). Sur le pouvoir pathogène de certaines souches de vibrions habituellement considérés comme saprophytes. [**Pathogenicity of certain vibrio strains usually considered as saprophytic.**]—*Ann. Inst. Pasteur* **96**, 268-275. [English summary modified.] **2388**

Certain vibrio strains isolated from aborted calves have the main biochemical properties of *V. fetus*, but differ from it serologically, and grow abundantly in culture media in aerobic conditions. These strains have for g.pigs, particularly pregnant females, a pathogenicity as high as that of the most virulent strains of *V. fetus*. *In vitro*, they form toxic substances which kill sheep and goats in less than 12 hours. After i/v injection of a few ml., these animals almost always develop acute bronchopneumonia, and often haemorrhagic and necrotic lesions of the kidney and liver. The lesions are practically identical in animals receiving culture filtrate only.

Three conclusions can be drawn: (1) Pathogenicity for g. pigs does not differentiate *V. fetus* from certain vibrios usually considered as

saprophytic. (2) These vibrios are highly toxinogenic. (3) They may possibly cause disease in domestic animals.

HIEPE, T., GÜRTLER, H. & KÄSTNER, R. (1958). Erfahrungen bei der Bekämpfung der infektiösen Klauenentzündung (Moderhinke) der Schafe. **[Control of foot rot in sheep.]**—*Mh. VetMed.* **13,** 590-597. **2389**

The necessity was stressed for a foot rot control programme in East Germany, consisting of quarantine, disinfection, washing of feet with copper sulphate soln., and either surgical or medical treatment. Over 1,500 sheep from 35 infected flocks responded to treatment with "xanthocillin complex" (a penicillin–triethylene glycol compound), and about 2,000 from 45 flocks to a proprietary foot rot ointment.—E.G.

VERTINSKII, K. I., DANILOVA, A. K., ITKIN, B. Z. & PREOBRAZHENSKII, N. M. (1958). **[Studies on foot rot in sheep.]**—*Trud. Mosk. vet. Akad.* **23,** 166-174. [In Russian.] **2390**

The authors' observations on 400 sheep supported the findings of Mutovin [*V.B.* **27,** 1395] that foot rot was a non-specific non-contagious disease. They considered it to be a local manifestation of general disturbances caused by poor feeding or bad hygiene. It was best treated by improving feeding and management.—R.M.

LÖLIGER, H.-C. (1958). Vergleichende Untersuchungen über die nichteitrigen Nebenhodenentzündungen bei Schaf- und Ziegenböcken. **[Non-purulent epididymitis in sheep and seminal congestion in goats.]** — *Dtsch. tierärztl. Wschr.* **65,** 544-546. [Summary in English.] **2391**

Seminal congestion in goats and non-purulent epididymitis in rams closely resemble each other morphologically. Both are, as a rule, accompanied by hydrocele formation. Aetiologically, however, there appears to be a difference. L. isolated *Escherichia coli* and pseudomonas from lesions and semen of infected male goats, whereas organisms isolated from rams by other authors were chiefly *Brucella ovis,* but also *Past. pseudotuberculosis, E. coli* and species of haemophilus and neisseria. It appears likely that this disease complex is a flock-specific infection, the severity of lesions depending on the virulence of the infective agent involved, on organ resistance and the general condition of the animals concerned.—E.G.

COMOTTI, G. (1958). Stato attuale e prospettive della lotta contro la tubercolosi e la brucellosi bovina nelle Marche. **[Control of bovine tuberculosis and brucellosis in the Marches, Italy.]**—*Vet. ital.* **9,** 887-898. **2392**

The control of TB. and brucellosis was initiated (on a voluntary basis) in 1951. Satisfactory results obtained to date are reviewed and prospects and future policy are discussed.

—T.E.G.R.

PIRSCH, J. B. & MIKA, L. A. (1959). **Studies on mixed infections. IV. Role of bacterial endotoxin in combined infection with *Brucella suis* and *Coxiella burnetii*.**—*J. Bact.* **77,** 185-188. [Authors' summary modified.] **2393**

Injections of irradiated, or irradiated and sonically treated cell preparations of *Br. suis* did not alter the course of a subsequent infection with *Rickettsia burneti* in g.pigs. However, pretreatment with *Br. suis* endotoxin decreased the lethality of superimposed *R. burneti* infections. Only s/c injections of endotoxin interfered; intracardial injections were of no avail. The interference seemed to be a specific attribute of brucella endotoxin since lipopolysaccharides extracted from *Escherichia coli* and *Salmonella* were inactive.

✓KAVIT, A. Y. (1958). **Cryptococcic arthritis in a Cocker Spaniel.**—*J. Amer. vet. med. Ass.* **133,** 386-388. **2394**

This disease caused by *Cryptococcus neoformans* in an 18-month-old dog was characterized by lameness with swelling, high temp. and rising leucocyte count: from 23,000 to 31,750 per cu. mm. with an increase of neutrophiles from 82% to 95%.

Various antibiotics, mycostatics and prednisolone did not materially inhibit the disease.

Carpal joint fluid was used for cultures on Brewer's medium, aerobically incubated blood agar and chocolate agar in CO_2. Typical growth was obtained in Brewer's and on blood agar. Subcultures from Brewers to mycosel agar with penicillin, streptomycin and cycloheximide failed to grow. Subcultures from Brewer's to Sabouraud's agar gave typical colonies in 2 days. Indian ink preparations from Brewer's and blood agar showed typical capsular organisms. Organisms were recovered from 3 mice which died after i/p inoculation.

X-ray plates of joints showed 'moth-eaten' appearance due to osteolysis with articular and periarticular inflammation. Smears of c.s.f. stained with Indian ink revealed the organisms.

Practically all organs and tissues were affected and cryptococcal organisms were identified even in haematoxylin and eosin stained section in all affected structures.

—IRENE M. DIXON.

✓ LITTMAN, M. L. & SCHNEIERSON, S. S. (1959). *Cryptococcus neoformans* **in pigeon excreta in New York city.**—*Amer. J. Hyg.* **69,** 49-59. **2395**

Specimens of pigeon excreta were examined for pathogenic fungi by direct plating on liver–spleen–glucose blood agar and by incubating at 37°C. *Cryptococcus neoformans,* confirmed by morphological, cultural, biochemical and by virulence studies, was isolated from 72 of 201 specimens. *Candida albicans* was found in 12 specimens and *Nocardia asteroides* in one. Neither *Histoplasma capsulatum, Coccidioides immitis* nor *Blastomyces dermatitidis* was recovered.—R.M.

✓ WAGNER, V., TOMŠIKOVA, A., VILIM, V. & ZDAŘIL, J. (1958). Anteil der Torulastämme an der Ätiologie der Melkerknoten. **[Role of torula strains in the aetiology of milkers' nodules.]**—*Zbl. Bakt. I.* (*Orig.*) **173,** 260-273. [Summaries in English, French, Spanish and Russian. English summary modified.] **2396**

Eight cases of milkers' nodules were examined clinically and microbiologically. From the skin lesions in five cases micro-organisms were isolated which grew only at the borderline between the condensed fluid and the dry part of Sabouraud medium. The strains had the biochemical properties of the genus *Torula* (*Cryptococcus*). The determination of the species is less certain, though the strain was most similar to *Torula hominis.* No pathogenicity could be demonstrated by the inoculation of animals. Only if terramycin was given with the inoculum or if the mice were exclusively fed on cottonseed cake (on which the infected cows had been fed) for 8 days before inoculation, could fatal disease be produced in mice. Neither by the agglutination test nor by the Coombs test could antibodies be demonstrated in the sera of the patients.

BONNER, R. D. (1958). **The fungus flora of cattle feeds: taxonomical, cultural and ecological aspects.** — *Dissertation, Pennsylvania* pp. 107. [Abst. from abst. in *Diss. Abstr.* **19,** 28.] **2397**

The present work is a taxonomical study of the fungus flora associated with feeds that were suspected to be the source of toxins, allergenic substances or pathological agents. Non-suspected feeds were studied for comparative purposes. Cultural and ecological aspects of the problem were investigated in connexion with some or all species isolated.

Sixty-five species representing 3 classes, 7 orders, and 12 families were identified from suspected and non-suspected feeds. Thirty-eight of the 65 species were found on feeds that were not suspected of disease involvement. Two species, *Arachniotus terrestris* and *Penicillium vermiculatum,* were found on non-suspected feeds, but not on the suspected samples. More than one-third of the species isolated had histories of disease involvement in livestock.

A species of *Ascocybe* was isolated which differs from the only other known species, *Ascocybe grovesii.*

The influence of temperature and relative humidity on the growth of ten fungi was determined in order to clarify their influence on mould development under storage conditions. Four growth types based upon visual estimation of growth and dry mycelium determination were found to occur among the ten species, viz., (1) *Fusarium moniliforme, Mucor Jansenni* and *Mucor racemosus,* species that developed very rapidly in favourable environmental conditions: (2) *Aspergillus fumigatus, Monascus purpureus* and *Penicillum purpurogenum,* species that developed over a wide range of conditions and produced moderate amounts of mycelium (and spores); (3) *Alternaria tenuis, Chlamydomyces palmarum* and *Cladosporium elatum,* species that produced thick mycelial colonies under favourable conditions and thin growths in adverse environments; and (4) *Oospora lactis,* which was highly restricted under the conditions studied.

LINDLEY, E. P. (1958). **The rapid slide agglutination test in the control of contagious bovine pleuropneumonia in Nigeria.** — *Bull. epiz. Dis. Afr.* **6,** 373-375. [In French pp. 376-377.] **2398**

Between 1955 and 1957, 4,332 cattle were submitted to this test. 576 were positive, and of these 469 had lung lesions. Of 86 negative cattle in infected herds, 46 had lung lesions at slaughter. The test is considered suitable for herd but not for individual diagnosis of this disease.

—M.G.G.

BLANCO LOIZELIER, A. (1958). Estudio experimental sobre algunos métodes de vacunación contra la agalaxia contagiosa. (Tesis Doctoral.) **[Experimental study of some methods of immunizing against contagious agalactia.]** —*Rev. Patronato Biol. anim., Madrid* **4,** 83-130. [Summaries in English and French.] **2399**

Three strains of the causal agent of contagious agalactia were cultured in embryonated eggs, by inoculation into the chorioallantois or yolk sac on the 9th day of incubation. The strains killed the embryos 36–72 hours after inoculation. Two strains retained their virulence

for sheep after 41 and 45 passages in chick embryos, and these were used for the production of killed adsorbed vaccines, which protected sheep from 1–10 lethal doses of the agent 3 months after inoculation. The third (strain P) lost its virulence for sheep between the 34th and 36th passage and was used for the production of a freeze-dried live vaccine. The dose of Strain P necessary to produce solid immunity in sheep was at least 100 chick-embryo lethal doses. Inoculation of Strain P into sheep was followed by slight fever; and also a slight and temporary decrease in erythrocytes and increase in neutrophiles in peripheral blood. Full details of the work are given in this doctoral thesis.—R.M.

CIORTEA, G., TACU, D. & DANIELESCU, G. (1958). Acţiunea penicilinei asupra culturilor de *Capromyces agalactiae* şi utilizarea ei la prepararea vaccinului antiagalactic. **[Utilization in vaccine production of the action of penicillin on the agent of contagious agalactia of sheep and goats.]** — *Lucr. ştiinţ. Inst. Pasteur, Bucureşti* **3,** 289-293. [In Roumanian. Summaries in French, German and Russian.] **2400**

Penicillin in concentrations of 6,000 i.u. per ml. had no inhibiting effect on cultures of the agent of contagious agalactia of sheep and goats. In conc. of 40 i.u./ml. it killed within 24 hours diplococci and staphylococci in experimentally infected ox serum. Aluminium hydroxide vaccine was purified by the addition of 40 i.u./ml. of penicillin.—E.G.

LUMB, W. V. (1958). **Haemobartonellosis in the dog.**—*Pap. 8th Gaines vet. Symp.* pp. 15-16. [New York: Gaines Dog Research Center.] **2401**

Haemobartonellosis was diagnosed as the cause of anaemia in a dog, from which a tumour of the spleen had been removed a month previously. Success was claimed for treatment by a single i/v inj. of aqueous soln. of oxophenarsine hydrochloride at 4·5 mg./kg. body wt. Reports from various parts of the U.S.A. indicated that as many as 8% of adult dogs may be latent carriers of the parasite.—IRENE M. DIXON.

FLINT, J. C., ROEPKE, M. H. & JENSEN, R. (1959). **Feline infectious anemia. II. Experimental cases.** — *Amer. J. vet. Res.* **20,** 33-40. **2402**

Cats of all ages were readily infected with the agent of feline infectious anaemia, *Haemobartonella felis,* by i/p, i/v or oral inoculation of blood from affected cats. Splenectomy prior to inoculation appeared to have little effect. Transmission to splenectomized rats, mice and dogs was not successful. Cats haematologically and clinically recovered for periods of 22–79 days were not immune to re-infection whilst stress caused a relapse in 2 others. Cats inoculated with the blood of 4 apparently healthy cats developed the disease. Treatment by blood transfusions and broad spectrum antibiotics for at least 21 days appeared to be of value.

—A. ACKROYD.

DIMOPOULLOS, G. T., SCHRADER, G. T. & FOOTE, L. E. (1959). **Electrophoretic studies of bovine serum. II. Concurrent hypoglobulinemia and natural infections of eperythrozoonosis.**—*Proc. Soc. exp. Biol., N.Y.* **100,** 55-58. [Authors' summary modified.] **2403**

In natural eperythrozoonosis in calves serum globulins decreased to an abnormally low level. This observation offers possibilities for diagnostic and clinical criteria. The implications of hypoglobulinaemia in eperythrozoonosis are discussed.

See also absts. **2603-2610** (Sporidesmium bakeri); **2611** (diseases of **nutria**); **2612** (of zoo animals); **2613** (of Antarctic birds); **2620** (sheep pneumonias); **2624** (Haemophilus suis); **2651** (enzyme treatment); **2706** (report); **2707** (book).

DISEASES CAUSED BY PROTOZOAN PARASITES

LIPPI, M. & GRIMALDI, S. (1958). Le granulazioni tossiche dei leucociti neutrofili nella tripanosomiasi sperimentale della cavia da *Trypanosoma brucei.* **[Toxic granulation of neutrophile leucocytes in experimental trypanosomiasis in guinea-pigs.]** — *Arch. ital. Sci. med. trop.* **39,** 201-205. [Summaries in English, French and German.] **2404**

Granules in the peripheral w.b.c. of eight experimentally infected g.pigs were studied by three different staining methods; an index of degeneration was based on the averages obtained.—T.E.G.R.

SOLTYS, M. A. (1958). **Immunity in trypanosomiasis and its effect on chemotherapy.** — *Vet. Rec.* **70,** 657-660. **2405**

S. described his previous work on the neutralization reaction of trypanosomes with immune serum [*V.B.* **28,** 1402] and acquisition by cattle of resistance to *T. congolense* [*V.B.* **25,** 2337]. Further work had shown that Strain

O of *T. brucei*, which became resistant to immune antibodies after passage through rabbits, was more resistant to suramin than the antibody-sensitive variant of the same strain. —R.M.

MURNANE, D. (1959). **Field and laboratory observations on trichomoniasis of dairy cattle in Victoria.** — *Aust. vet. J.* **35,** 80-83. [Author's summary modified.] **2406**

Of 50 Victorian dairy herds with a history of infertility, only one was affected by trichomoniasis. *Tr. foetus* was isolated and was of the "Belfast" serological type.

Trichomoniasis is unlikely to constitute a major cause of infertility in Victorian herds at present.

In laboratory experiments it was shown that an infected bull, without opportunity of being re-infected, remained a carrier for at least 16 months. Transmission experiments involving cows, bulls and steers as recipients and vaginal mucus from infected cows or cultures of *Tr. foetus* as test materials, are described, and observations on infection following service by an infected bull.

The persistence and distribution of the organism in the genital organs of the cow has been studied.

FITZGERALD, P. R., JOHNSON, A. E., THORNE, J. L. & HAMMOND, D. M. (1958). **Experimental infections of the bovine genital system with trichomonads from the digestive tracts of swine.** — *Amer. J. vet. Res.* **19,** 775-779. **2407**

These experiments have shown that trichomonads from the nasal cavity, stomach or caecum of the pig may become established in the genital tract of cattle.

Heifers were inoculated intracervically at oestrus with porcine trichomonads from cultures together with semen. The animals failed to become pregnant and the trichomonads persisted in the vaginal mucus for 35 to 77 days.

When freshly isolated stomach contents, caecal contents or nasal washings containing trichomonads were introduced into the vagina of heifers, the trichomonads persisted for periods varying from 33 to 133 days.

One of 4 pregnant heifers aborted after intrauterine injection of porcine caecal trichomonad cultures. The organisms persisted in the vaginal mucus for 28 days.

Six heifers, in which porcine trichomonads were established in the genital tract, were naturally or artificially inseminated. The low conception rate among these few animals suggested that the parasites could cause sterility.

A bull became infected with porcine caecal trichomonads as a result of serving an experimentally infected heifer. This bull then transmitted the infection to a virgin heifer by coitus. The parasites persisted in the bull for 4 months after which time they were no longer demonstrable.

These experiments suggest that there are similarities between *Tr. foetus* and porcine trichomonads, particularly those derived from the caecum.—L. P. JOYNER.

NOVARA, V. (1959). Tricomoniasi dei polli. Influenza dell'alimentazione antibiotata. **[Dietary antibiotics and trichomonas infection in fowls.]**—*Vet. ital.* **10,** 17-23. [Summaries in English, French and German.] **2408**

The disease was diagnosed in three flocks comprising 1,600 fowls. Mortality was 10·5%, morbidity 35·5%; birds aged 45–50 days were mainly affected. Clinical features and lesions are described; *Trichomonas gallinae* was isolated from the lesions. Transmission experiments were carried out on 18 healthy birds, aged 20 days, divided into two groups. Antibiotics were added to the diet of one group, in which symptoms appeared 24 days after infection, a decrease in weight gains was observed from the 30th day onwards and three of the birds died between the 25th and 60th days. In the other group no symptoms were observed apart from retarded growth in one bird.—T.E.G.R.

SEMELLINI, L. (1959). Diffusione del *Trichomonas eberthi* (Kent 1880) e trichomoniasi dei polli. **[*Trichomonas eberthi* infection in fowls in Italy.]** — *Nuova Vet.* **35,** 28-38. [Summaries in English, German and Spanish.] **2409**

A survey of 242 flocks under different conditions of management revealed that *T. eberthi* is widespread, varying with environmental conditions; it is only rarely pathogenic—when the blood stream is invaded owing to increased invasiveness of the organism and susceptibility of the host.—T.E.G.R.

ISHIHARA, T. & ISHII, S. (1958). **[Studies on piroplasmosis by *Theileria mutans* in Japan. I. Development of *Theileria mutans* in erythrocytes of cattle.]**—*Bull. Nat. Inst. Anim. Hlth, Tokyo* No. 34, pp. 121-134. [In Japanese. Abst. from English summary.] **2410**

The authors classified *Th. mutans* into 10

morphological types (illustrated). Five tables (in English) show the relative intracorpuscular occurrence of each type at different stages of infection in the peripheral blood of cattle, in the peritoneal cavity of cattle, mice and rabbits inoculated intraperitoneally, and in muscle of cattle inoculated intramuscularly. The life-cycle of the parasite was discussed.—R.M.

HUYGELEN, C. & MORTELMANS, J. (1958). Existence d'une piroplasmose du mouton au Ruanda-Urundi. Note préliminaire. **[Ovine piroplasmosis in Ruanda-Urundi.]** — *Ann. Soc. belge Méd. trop.* **38,** 531-534. [In French. Summaries in English, Flemish, German and Spanish. English summary modified.] **2411**

Piroplasmosis in a sheep at Ruanda-Urundi is described. This infection has never been seen before in sheep in Central Africa. In the same smear, forms resembling *Babesiella,* and others with the characteristics of the genus *Babesia* were seen.

TORLONE, V. & PATERA, E. (1958). La piroplasmosi suina in Umbria. **[Piroplasmosis of pigs in Umbria, Italy.]**—*Vet. ital.* **9,** 808-813. [Summaries in English, French and German.] **2412**

An account of *Babesia perroncitoi* infection in two pigs, one of which carried a large number of *Rhipicephalus sanguineus.*—T.E.G.R.

ZWART, D. (1959). Bestrijding van bloedprotozoaire ziekten bij runderen op Nederlands Nieuw-Guinea. **[Control of diseases caused by blood-protozoa in cattle in Dutch New Guinea.]** — *Tijdschr. Diergeneesk.* **84,** 156-162. [In Dutch. Summaries in English, French and German.] **2413**

Z. described the control of piroplasmosis and anaplasmosis by therapy, tick control, and by appropriate treatment of cattle moving into infected or uninfected areas. Ticks (*Boophilus microplus*) were controlled by weekly spraying of cattle with 0·05% BHC, but eradication of ticks was not considered to be feasible at present. Anaplasmosis appeared to be absent from indigenous cattle. Quinuronium was used for treating piroplasmosis.—R.M.

BATTELLI, C. & GIGLIO, D. (1958). Risultati conseguiti in practica con l'aureomicina per via orale nella terapia dell'Anaplasmosi bovina. **[Results of oral administration of chlortetracycline in the treatment of bovine anaplasmosis.]**—*Vet. ital.* **9,** 917-922. **2414**

Cattle with anaplasmosis recovered after treatment with chlortetracycline, administered orally at 1 g. every 4 hours, up to 8 g.
—T.E.G.R

LUNDE, M. N. & JACOBS, L. (1959). **Characteristics of the toxoplasma hemagglutination test antigen.**—*J. Immunol.* **82,** 146-150. **2415**

The haemagglutination test offers advantages over the dye test such as greater ease of performance, safety and possibilities of standardiaztion. This report presents results of tests on the characteristics of the antigen, especially on its stability under a variety of conditions, done with a view to determine means of standardization.—R.M.

BIMMER, E. & MOHR, W. (1958). Therapie-Versuche bei experimenteller Mäuse-Toxoplasmose. **[Therapy of experimental toxoplasmosis in mice.]** — *Z. Tropenmed. u. Parasit.* **9,** 225-234. **2416**

Pyrimethamine and "Supronal", singly or combined, were tested in mice with experimental toxoplasmosis. Doses of pyrimethamine totalling 11·25 mg. over a period of five days, cured 50%, whereas 102 mg. of "Supronal" over 6 days did not cure but only delayed death in infected mice. Toxoplasms were not demonstrable P.M. A combined dose of 4 mg. of pyrimethamine and 55 mg. of "Supronal" cured 60%, but was not well tolerated. Smaller doses delayed but did not prevent death.—E.G.

YOST, D. H. (1958). **Encephalitozoon infection in laboratory animals.**—*J. nat. Cancer Inst.* **20,** 957-963. **2417**

Encephalitozoon cuniculi, present in epithelial cells of kidney papillae, urine and granulomatous lesions of the brain in laboratory rodents, but also in dogs, produced as a rule a mild febrile infection. Differential diagnosis from toxoplasmosis was discussed.—E.G.

See also absts. 2615 (coccidiosis of hares); 2706 (report).

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

SARAIVA, D. (1959). Observaçoes sôbre inoculação de vírus aftoso em matadouro e seus efeitos sôbre a incidência da doença na zona. **[Spread of foot and mouth disease from vaccine production centres.]**—*Arch. Inst. Pesq. vet. Finamor* 1956/57. **2,** 32-37. [In Portuguese. Summary in English.] **2418**

Vaccine is produced at slaughterhouses where isolation is impossible. During 1952–57 there was no correlation between the strains

responsible for naturally occurring outbreaks of F. & M. disease in the municipality and the strains used for vaccine production. It is considered that in the course of passage on tongue epithelium the virus loses its infectivity.
—T.E.G.R.

GUERREIRO, M. G. (1959). O emprêgo da vacina trivalente no combate à febre aftosa nas exposições e feiras de gado no Rio Grande do Sul. **[The use of trivalent vaccine for the control of foot and mouth disease at cattle shows in Rio Grande do Sul, Brazil.]**—*Arch. Inst. Pesq. vet. Finamor* 1956/57. **2**, 10-13. [In Portuguese. Summary in English.] **2419**

Trivalent vaccine was used on 21,170 cattle at 90 shows during 1952–56. Immunity of these cattle was assumed from the fact that none developed the disease although outbreaks caused by each type of virus occurred in the districts during that period.—T.E.G.R.

KHANKISHIEV, A. M., GADZHIEV, K. S. & ALEKPEROV, Y. G. (1958). **[Foot and mouth disease in new-born lambs.]** — *Veterinariya, Moscow* **35**, No. 9 pp. 59-60. [In Russian.] **2420**

In an outbreak of F. & M. disease which coincided with lambing time there were heavy losses of lambs aged 2–25 days. 193 of 205 lambs died in one flock and 368 of 808 died in another. "Tiger heart" was a common P.M. finding. Measures recommended for reducing losses included isolation of lambs at birth and hand-rearing them on boiled ewes' milk.—R.M.

KUNTER, E. (1958). Untersuchungen über das Vorkommen von Maul-und-Klauenseuche-Virus in der Rindergalle unter besonderer Berücksichtigung seiner Tenazität. **[Presence of foot and mouth disease virus in ox bile.]** —*Arch. exp. VetMed.* **12**, 688-695. **2421**

F. & M. disease virus was demonstrable in conc. of 10^{-1} in seven of 65 bile samples from cattle slaughtered after intralingual infection with Type O_2 virus, in four of 25 samples from cattle slaughtered 48 hours after infection, but not in those from cattle slaughtered 66 and 168 hours after infection. In samples the pH value varied from 7·4–7·8 after 30 min., to 8·75 to 9·1 after 24 hours. The virus was not demonstrable in infected samples after storage for 24 hours at 4°C. Although survival of F. & M. disease virus in bile was limited, bile did not appear to possess viricidal properties.—E.G.

PALMA, E. E., RIVENSON, S. & GIOVANELI, N. E. (1958). Ensayos con una tecnica modificada del "embrioma" de Thomas. **[Production of foot and mouth disease vaccine using the 'embryoma' technique.]**—*Gac. vet., B. Aires* **20**, 161-172. **2422**

The "embryoma" technique of Thomas [*V.B.* **23**, 2518] depends on the development of a large gelatinous mass after implantation of bovine foetal tissue beneath the skin of cattle. The authors harvested F. & M. disease virus from the gelatinous mass following surgical removal 72 hours after intralingual infection of the implanted cattle. Foetal connective tissue and epithelium were suitable for implantation, but muscle was not.—R.M.

KUNTER, E. (1958). Ein Beitrag zur Extraktion des Maul-und-Klauenseuche-Virus aus Rinderaphthendecken. **[Extraction of foot and mouth disease virus from aphthous tissue.]** —*Arch. exp. VetMed.* **12**, 792-801. **2423**

The technique of extraction of F. & M. disease virus from bovine aphthous tissue with double-distilled water and isotonic phosphate buffer was described. Extraction was repeated four times but the amount of virus isolated the fourth time was minimal. Details were given of the preparation and evaluation of vaccine.
—E.G.

FEDIDA, M. (1958). Anesthésie locale de la langue des bovidés en vue du titrage du virus aphteux. **[Local anaesthesia of the tongue of cattle for the titration of foot and mouth disease virus.]**—*Bull. Acad. vét. Fr.* **31**, 441-447. **2424**

The method of restraint of the animal and the site and method of injection are described. A dose of 5 ml. of local anaesthetic ("Scurocaine" or "Xylocaine") is injected into the area of the lingual nerve; the needle is then withdrawn to the region of the hypoglossal nerve where a further dose of 5 ml. is injected. The operation is repeated on the other side of the head. Anaesthesia sets in after 20–25 min. and lasts 30–40 min. or even 1½ hours.—T.E.G.R.

ZIMMERMANN, T. (1959). Untersuchungen über Aggregatbildung und Inaktivierung des Virus der Maul- und Klauenseuche. **[Aggregate formation in relation to inactivation of foot and mouth disease virus.]**—*Z. Naturf.* **14b**, 17-24. **2425**

Previous studies showed that the formation of aggregates by dilutions of the virus of Teschen disease could influence the process of inactivation by heat, and could cause fluctuations in titre [*V.B.* **29**, 398]. The present work showed that the same phenomena occurred with

dilutions of F. & M. disease virus. Some practical conclusions for avoiding variations in infectivity of virus solutions were drawn.—R.M.

DINTER, Z. & SIBALIN, M. (1958). Über die Plaque-Bildung durch das Maul-und-Klauenseuche-Virus. [**Plaque formation by foot and mouth disease virus.**] — *Arch. ges. Virusforsch.* **8**, 385-396. **2426**

The authors studied plaque formation and titration of nine strains of type O, 18 of type A, and eight of type C of F. & M. disease virus, in calf kidney cultures. All strains produced plaques, which, however, varied morphologically. In six strains it was impossible to establish a relationship between the number of plaques and virus concentration. Four strains produced minute plaques which could not be counted. Discrepancies between plaque titre and cytopathogenicity titre in different strains and different passages of the same strain indicated, as far as plaque formation was concerned, a mixed virus population. [See also *V.B.* **26**, 1605 & 1943; **28**, 1413 & 2122.].—E.G.

CUNHA, R. G. & EICHHORN, E. A. (1959). **Studies on rabbit-adapted foot-and-mouth disease virus. I. Propagation and pathogenicity.**—*Amer. J. vet. Res.* **20**, 133-137. **2427**

CUNHA, R. G., TORTURELLA, I. & SERRÃO, U. M. (1959). **Studies on rabbit-adapted foot-and-mouth disease virus. II. Immunogenicity.** — *Ibid.* 138-144. [Authors' summaries modified.] **2428**

I. One strain each of the Vallée O, Vallée A, and Waldmann C types of F. & M. disease virus was adapted to the young rabbit by serial passage. The 137th, 40th, and 40th passages, respectively, were reached. Initially, rabbits 1–2 days old were used but, by using rabbits of gradually increasing age, it was possible to infect 51-day-old rabbits with the O type strain from the 112th passage on. With the O type strain, prolonged serial passage reduced the pathogenicity for cattle.

II. F. & M. disease virus adapted to the rabbit was used for the preparation of aluminium hydroxide-inactivated virus vaccines. But there was no evidence of protection in cattle given these vaccines. Type O virus of the 111th serial passage in rabbits was tested as a modified live-virus vaccine. Its pathogenicity was low. Seven of 17 cattle inoculated i/d into the tongue and 2 of 21 inoculated into the skin became clinically infected, as did 2 of 142 cattle inoculated into the skin in field trials. The disease did not appear in cattle in contact with the inoculated animals. 79% of the non-reactors in the experiments resisted challenge with bovine virus 3 weeks after vaccination. In the field trials, a satisfactory antibody titre developed in one third of the cattle and persisted for a six-month observation period. There was also an increase in antibody titre in cattle that were immune initially —about one third of the total vaccinated.

LUCAM, F. & FEDIDA, M. (1958). Une nouvelle méthode quantitative pour l'appréciation de l'immunité antiáphteuse. [**Quantitative estimation of immunity in foot and mouth disease.**] — *Bull. Off. int. Epiz.* **49**, 596-621. **2429**

Immunity tests at present in use are discussed. A quantitative estimation is suggested. This is based on the formula $K = T/V$, when K is the protective index, T is the virus titre in controls and V is the virus titre in vaccinated animals. K is, therefore, a variable number of infective units which, on injection into the lingual mucosa of a group of vaccinated animals, causes primary lesions in 50% of the animals of which only some will develop secondary lesions. The degree of immunity will, therefore, vary directly with K. This will provide an index of both local and general immunity. The cost involved is low, only 4 cattle being used for each valency, and the method is simple and time-saving (titres can be assessed in 36–46 hours).—T.E.G.R.

BROOKSBY, J. B. (1958). **The virus of foot-and-mouth disease.** In "Advances in Virus Research" vol. 6, pp. 1-37. [New York: Academic Press.] **2430**

A critical review of the literature on various properties of the virus, including immunological types, adaptation to mammals, titration and active immunity.—R.M.

RÖHRER, H. & PYL, G. (1958). Das Maul-und-Klauenseuche-Virus. [**Foot and mouth disease virus.**] In "Handbuch der Virusforschung", Vol. 4. pp. 379-458. [Vienna: Springer Verlag.] **2431**

An extensive but uncritical discussion of the literature on some properties of the virus, such as proliferation in animals, tissue culture, and chick embryos; plurality and variability; lab. diagnosis; and physical properties. (485 references).—R.M.

COOPER, P. D. & BELLETT, A. J. D. (1958). **A transmissible interfering component analogous with an incomplete form of vesicular stomatitis virus.**—*Absts. of Proc. VIIth Int. Congr. Microbiol., Stockholm* pp. 232-233. [Authors' abst.] **2432**

Serial (more than one or two) undiluted pas-

sages (UP) of vesicular stomatitis virus in chick embryo cell monolayers gave low virus yields (10 or less plaque-forming units, pfu/cell) compared with dilute passage (DP, 500 or more pfu/cell). It is concluded that low yields were due to the production on serial UP of a transmissible interfering component (T), as low yields were also obtained by a mixture of UP and DP stocks; certain other explanations such as non-infection of all cells, non-completion of the growth cycle, genotypic viral change, viral inactivation, poor cultures or media variations were excluded. UP stocks gave a marked von Magnus effect (increase of yield with dilution of seed) while DP stocks did not; this effect was used as a rough end-point assay for T. Multiple infection with live virus *per se* (DP stocks) gave high yields, and mixed infection between live virus (pfu) and T were required for interference and for propagation of T. Heat or UV inactivation of virus did not create T.

Yield was dependent upon the relative multiplicities of infection of pfu and T. The interference took the form mostly of exclusion, with some slowing of release, as those cells able to release pfu yielded a normal number of pfu. T by itself is not toxic, and those cells receiving T but not pfu in the first cycle of growth were protected from cytopathic effect for several days at least. Cells receiving T and pfu were killed whether or not they released virus. Despite analogies between T and incomplete virus, direct experimental evidence for T as an incomplete form is at present lacking.

GREENHALL, A. M. (1959). **The ecological rôle of Trinidad bats, especially the vampire, and bat rabies.**—*Vet. Rec.* **71**, 188-190. **2433**

Over 60 species of bats, of 9 families, have been recorded in Trinidad and Tobago, and the actual number may be over 100. Rabies virus has been isolated from 8 bat species in Trinidad: 3 insectivorous, 3 fructivorous, and 2 vampire species. The common vampire *Desmodus rotundus* is the most important transmitter of rabies. G. suspects that it is capable of transmitting rabies for a period of 11 months. Trinidad bats are important in controlling insects, pollinating flowers, and dispersing seeds, and this must be considered before measures are taken against any species.—M.G.G.

CANESSA, S. (1959). Il meccanismo dell'immunità antirabbica. **[The mechanism of immunity against rabies.]** — *Vet. ital.* **10**, 43-46. **2434**

The mechanism of immunity following s/c inj. of large doses of rabies virus in dogs and the mode of action of phenolized vaccines are discussed.—T.E.G.R.

GHEORGHIU, I., NIŢOIU, I. & ALBOIU, M. (1958). Controlul valorii imunogene pe iepuri, a vaccinului antirabic preparat cu virus fix încorporat în hidroxid de aluminiu. **[Evaluation in rabbits of the immunizing property of adsorbed fixed virus rabies vaccine.]**—*Lucr. ştiinţ. Inst. Pasteur, Bucureşti* **3**, 275-287. [In Roumanian. Summaries in French, German and Russian.] **2435**

Immunological response in rabbits to vaccination with adsorbed fixed virus rabies vaccine depended on the method of vaccination and the length of time between vaccination and challenge. The lowest response was after vaccination with 0·3 ml. intracerebrally or 1 ml. intraperitoneally, followed by intraocular challenge 10 to 22 days later with 0·2 ml. of a 15% virulent brain suspension. Following s/c, i/m, i/d and intraocular vaccination, the number of immune rabbits varied from 33–75%. About 86% resisted challenge 10–14 days after intralingual vaccination with 0·3 ml. Resistance to infection was observed in about 13% of controls.—E.G.

STARKE, G. & SEIDL, S. (1958). Experimentelle Untersuchungen zur Frage der Hämagglutination des Tollwutvirus. **[Experimental research on rabies virus haemagglutination.]**—*Z. ges. Hyg.* **4**, 118-123. **2436**

The haemagglutination capacity of rabies virus was tested against 2% suspensions in saline of fowl, rabbit, g.pig, cat, dog, sheep, pig, ox, horse and human group A, B, O and AB erythrocytes, using avianized Flury strain as antigen. Results obtained were either negative or non-specific, which was attributed to the presence of numerous ballast substances in the virus material.—E.G.

ATANASIU, P. & LÉPINE, P. (1959). Multiplication du virus rabique des rues sur la tumeur épendymaire de la souris en culture de tissus. Effet cytolytique. **[Multiplication of rabies street virus in tissue culture of mouse ependymoma.]** — *Ann. Inst. Pasteur* **96**, 72-78. [English summary modified.] **2437**

After two transfers the titre of rabies virus in the supernatant fluid of tissue culture remained constant at 10^2–10^4.

Twenty-four passages were carried out. Titres of $10^{1\cdot5}$–10^3 were obtained until the 22nd transfer. This proves that rabies street virus grows on mouse ependymoma cells in tissue cul-

ture. The incubation period ranges from 10 to 14 days. The virus induces the formation of oxyphilic inclusion bodies resembling Negri bodies. From the fifth passage and in the course of 15 transfers, the culture fluid induces a cellular degeneration, which can be prevented by a specific immune serum.

These experiments show that it is possible to carry out the titration of antirabic sera on tissue cultures, a technique which would present many advantages over the usual method of neutralization tests on animals.

The strain used retained all the properties of a street virus.

NELSON, M. & LEWIS, F. A. (1958). **A relationship between swine and Asian strains of influenza virus.** — *Aust. J. exp. Biol. med. Sci.* **36**, 505-510. **2438**

The antigenic affinities and differences between the Asian strain, a pre-1935 strain (Swine) and post–1935 strains (PR8 and FMI) of influenza A virus were examined, employing individual human sera collected during and immediately subsequent to the 1957 Asian influenza epidemic in Melbourne.

It was shown that a Swine component is present in the Asian strain. The post-1935 strains do not appear to be antigenically related to the Asian.—A. CULEY.

ERNEK, E. (1959). Chrapačka väčšia (*Anas querquedula* L. 1758) ako možný rezervoár kliešťovej encefalitídy. [**The garganey** (*Anas querquedula*), **a possible carrier of tick-borne encephalitis.**]—*Vet. Čas.* **8**, 8-16. [In Slovak. Summaries in English, French, German and Russian.] **2439**

A neurotropic virus, pathogenic for mice and unweaned rats, isolated in Slovakia from the brain of a garganey, was identified by serum neutralization as that of Czechoslovak tick-borne encephalitis. Experimental transmission to domestic ducks and examination of wild ducks for specific antibodies is to be investigated.

—E.G.

SVEDMYR, A., VON ZEIPEL, G., HOLMGREN, B. & LINDAHL, J. (1959). **Tick-borne meningoencephalomyelitis in Sweden.** — *Arch. ges. Virusforsch.* **8**, 565-576. [In English.] **2440**

Of 176 patients with acute infections of the c.n.s., 68 had antibodies against viruses of the Russian spring–summer encephalitis/louping-ill group. Neutralizing antibodies were demonstrated in all of 22 sera from cattle on 10 farms near Norrtälje, eastern Sweden, and in one of 35 sera from cattle in south-western Sweden. [See also *V.B.* **28**, 2146.]—M.G.G.

MASCARO, L. A. (1958). Meningo encefalomielitis de los equinos y paraplegia infecciosa de los caprinos. [**Equine meningoencephalomyelitis and contagious paraplegia of goats.**] — *Rev. Vet. Milit., B. Aires* **6**, 134-137 & 169-182. **2441**

A disease of goats and horses (and to a lesser extent sheep and cattle), believed to be caused by a neurotropic virus, has been observed since 1953 in two parts of Argentina. Clinically it was characterized by initial fever, hyperaesthesia, muscle tremors (particularly in horses), convulsions, atrophy of the dorsolumbar muscles and incoordination. The clinical course lasted for from 1 to 22 months and mortality was about 10%. There was meningeal hyperaemia and foci of congestion and atrophy in the brain; also splenitis and glomerulonephritis, but no intracellular inclusions. Incubation period was 6–46 days in mice, 5–8 days in g.pigs, 19 days in rabbits and 7 days in sheep.

The disease was transmitted to mice by intracerebral inoculation of brain suspension and to pigs, sheep and horses by various methods of inoculation. Passage of the infective agent in g.pigs and mice increased its virulence.

The features of this disease were compared with those of Borna disease, equine encephalomyelitis, scrapie, louping-ill, and a contagious parapleglia of goats (similar to that described by Mlinac & Oswald in Yugoslavia in 1935) which has occurred in other parts of Argentina. Until more work was done on the causal agent, it was not possible to identify the disease with any described previously.—R.M.

TRAUB, E. (1959). Über die Immunität der weissen Maus gegenüber dem EEE-Virus. I. Mitteilung: Wirkung von Immunserum in vivo. 2. Mitteilung: Versuche mit Gewebekulturen. [**Immunity in mice to the virus of Eastern equine encephalomyelitis. I. Action of immune serum in mice. II. Experiments with tissue cultures.**]—*Z. ImmunForsch.* **117**, 70-94; 256-279. [Summaries in English, French, Spanish and Russian.] **2442**

Treatment of infected mice with hyperimmune serum prevented or inhibited active immunization. An explanation may be that injected antibodies were taken up by cells capable of producing antibodies and were inactivated in these cells by viral antigen.

In cultures of mouse lung cells, potent hyperimmune serum appeared to inactivate intracellular virus in the early stages of viral multiplication; at later stages only extracellular virus was neutralized. Cultured kidney cells

from immune mice were slightly less susceptible to infection than kidney cells from normal mice. —R.M.

FEEMSTER, R. F. *et al.* (1958). **Field and laboratory studies on equine encephalitis.** — *New Engl. J. Med.* **259,** 107-113. **2443**

The ecology of the Eastern equine encephalomyelitis virus has been studied in Massachusetts since 1939. Wild birds appear to be the source of the disease for horses and man. In surveys 22·6% of birds were infected in 1953, 46·6% in 1956 and 4·1% in 1957. *Culiseta melanura* appears to be the vector mosquito. In 1957, neutralizing antibodies against the virus were found in 4 of 85 fowls, 5 of 66 turkeys, 7 of 39 pigs, 3 of 228 pheasants, but none of 58 cows. —M.G.G.

EPSTEIN, B. (1958). Reaccion de anticuerpo y virus de la encefalomielitis equina oeste en cultivo de tejidos y valoracion cuantitativa de la prueba de neutralizacion. **[Neutralization of the virus of Western equine encephalomyelitis in tissue culture.]** — *Gac. vet., B. Aires* **20,** 213-223. [Summary in English.] **2444**

E. studied the cytopathogenic action of the virus on tissue cultures of HeLa cells, chick-embryo fibroblasts and rabbit kidney cells. 11 sera from horses in contact with the virus were tested for neutralization of the virus in tissue cultures. Virus and serum were allowed to react for 30 min. before the mixture was added to culture. Results were read 24, 48 and 72 hours after incubation of the culture: chick-embryo fibroblasts gave quicker results than the other tissues.—R.M.

—. (1958). **[Experimental report on equine infectious anemia. III.]** pp. 102. Hokkaido: Prefectural Government. [In Japanese. Summaries in English.] **2445**

This report contains 9 papers in Japanese (with English summaries) by S. Arakawa, H. Yaoi and their colleagues. They concern experimental studies on the virus and its adaptation to the brain of young mice. Some of the work has been published elsewhere [*V.B.* **23,** 2825 & **28,** 1054; *Arch ges. Virusforsch.* **8,** 621 (1959)]. —R.M.

GUBIN, A. P. & SHABUROV, M. S. (1959). **[Contact infection of horses with infectious anaemia.]**—*Veterinariya, Moscow* **36,** No. 2. pp. 38-40. [In Russian.] **2446**

A healthy foal kept in contact with 3 foals with clinical equine infectious anaemia from January to mid-May did not develop symptoms of the disease and histological examination of the organs showed no signs of infection. In a second experiment, 4 foals kept in contact with an infected foal for over 2 months in winter did not develop the disease and 2 were later shown to be susceptible to s/c injection of the virus. Both experiments took place at a time of the year when biting insects were absent.—M.G.G.

MCINTOSH, B. M. (1958). **Immunological types of horsesickness virus and their significance in immunization.**—*Onderstepoort J. vet. Res.* **27,** 465-538. [Author's abst.] **2447**

This is a study on the isolation of African horsesickness viruses from cases in immunized horses, their adaption to mice, an examination of their immunological relationship and the nature of the immunity in horses. While no difficulty is encountered in infecting mice with virus from cases in susceptible horses it is often impossible to infect them with blood taken from natural cases of horsesickness in immunized horses. The antibody present in these horses apparently prevents infection of the mice. However, if blood from sick immunized horses is inoculated into ferrets or dogs, mice can be easily infected from the blood or tissues of these animals. It is essential that an effective method for the isolation of strains causing failures in vaccine immunity be available.

Immunological studies on all the available mouse-adapted horsesickness strains, 42 in number, were conducted, using hyperimmune sera prepared in rabbits in an intracerebral neutralization test in mice. These strains could be grouped into seven immunological types. While in these tests practically no cross-neutralization between heterotypic strains occurred, evidence is presented that there is probably a common basic antigenic relationship between all strains. The neutralization test used failed to show differences between homotypic strains. However, it is shown by a study on sera from several cases of horsesickness in immunized horses as well as the typing of the strains which caused the infections, that horses immune to one strain as judged by the presence of neutralizing antibody in their sera, can be infected fatally with another, homotypic strain. From this it is concluded that immunological differences do exist between some homotypic strains, as previous work on horsesickness has shown conclusively that there is a solid and durable immunity to the homologous strain.

It is advocated that equines be immunized with a vaccine containing a single strain from each of the seven immunological types. How-

ever, it is evident that such a vaccine will not give full protection. A certain percentage of failures in vaccine immunity, due to infection with strains which may even be homotypic to strains included in the vaccine, will occur. The possibility of additional as yet unidentified types also exists.

The typing of strains isolated from the enzootic horsesickness areas in South Africa during an epizootic in 1953 showed that during an epizootic heterotypic strains may be involved. Even strains isolated from the same farm differed. In these epizootic areas a polyvalent vaccine will give the best protection.

Although immunization with a polyvalent mouse-adapted vaccine has been practised for 20 years in South Africa, there is no evidence that the earlier encountered strains have been replaced by strains of divergent antigenicity.

SEMERDSCHIEV, B. & CHRISTOV, S. (1958). Komplementbindungsreaktion zur Diagnose des Virusaborts der Stuten. **[Complement-fixation test in equine virus abortion.]**—*Arch. exp. VetMed.* **12,** 802-807. **2448**

Of 2,054 serum samples from mares in districts of Bulgaria, in which presence of virus abortion was suspected, 803 yielded positive complement-fixation reactions, using three Bulgarian, one Hungarian and one Polish antigen. Carriers were demonstrated among 50 stallions from districts in which in previous years there had been outbreaks of equine influenza. Foals injected with semen from these stallions reacted clinically and serologically. Pregnant mares and g.pigs aborted after infection with material from aborted equine foetuses in which intranuclear inclusions were demonstrable. Specificity of the c.f. reaction was confirmed by examination of 197 samples from healthy horses, 72 from gas gangrene, Aujeszky's disease, anthrax, rabies, diphtheria and tetanus serum producers, and from 17, spontaneously infected with equine infectious anaemia.—E.G.

GENTRY, G. A. & RANDALL, C. C. (1959). **Protein changes in liver cell nuclei in hamsters infected with equine abortion virus.** — *Fed. Proc.* **18,** 478. **2449**

Livers removed from hamsters at 3-hourly intervals after experimental infection were fixed in formalin and sections were extracted with trichloracetic acid (90°C. for 15 min.), unextracted sections being kept as controls. The extracted sections, stained with mercuric bromphenol blue for total proteins, showed increased intensity in nuclear staining at 6–9 hours, with some variation at 12 and 15 hours, indicating that infection caused an increase in nucleic acid-bound protein. With alkaline fast green stain for basic proteins they showed clumping of the basic proteins throughout the nuclei at 6–15 hours after infection. Similar changes did not occur in unextracted sections.—T.E.G.R.

CORONEL, A. B. (1958). **Epidemiology of the recent rinderpest infection in the Philippines.** —*Philipp. J. Anim. Ind.* **17,** 113-131. **2450**

After 16 years' freedom from rinderpest, the disease was re-introduced into the Philippines in July 1955, apparently by buffaloes imported from India. Spread of the disease was checked by regulation of livestock movement and by vaccination, and the disease was regarded as eradicated in December 1955. Some interesting features of the outbreak, including the apparent failure of one batch of lapinized vaccine, were discussed.—R.M.

NAKAMURA, J. (1957). **United Nations. Report to the Federal Government of Nigeria on the production of rinderpest vaccine in Northern Nigeria.** pp. 13. Rome: Food & Agriculture Organization of the United Nations. (FAO Report No. 768.) **2451**

After working on rinderpest during a stay of about 4 months in Nigeria, N. made several recommendations. Avianized strains of rinderpest virus should be studied, because of their possibilities in vaccination and because they are cheap to maintain. The c.f. test should be the routine lab. method of diagnosis. Research should be carried out on the virus neutralization technique and on tissue culture of the virus. The keeping quality of the freeze-dried lapinized vaccine can be improved. Close contact should be maintained between the laboratories of Vom and Tokyo.—M.G.G.

SCOTT, G. R. & GINSBERG, A. (1959). **Adjuvant rinderpest vaccine: adverse sequelae.** — *Vet. Rec.* **71,** 151-152 & 153. [Authors' summary modified.] **2452**

In Kenya 24,786 cattle were vaccinated with an adjuvant rinderpest vaccine between 1953 and 1956. Many developed objectionable lesions at or near the inoculation site which led to the condemnation of an average of 4 lb. of meat per animal. Adjuvant vaccine given s/c always caused severe and persistent lesions, half of which were purulent. Vaccine given i/m caused persistent purulent lesions in half the animals.

NOICE, F. & SCHIPPER, I. A. (1959). **Isolation of mucosal disease virus by tissue cultures in Mixture 199, Morgan, Morton and Parker.**—

Proc. Soc. exp. Biol., N.Y. **100,** 84-86. [Authors' summary modified.] **2453**

A virus was isolated from cattle with mucosal disease and grown in tissue cultures of trypsinized ox kidney cells in Mixture 199. Two calves were inoculated with tissue culture virus and neutralizing antibodies were demonstrated in their serum between 15 and 25 days later. Serological tests in rabbits indicated the similarity of viruses isolated from 4 herds of cattle in North Dakota.

Voss, H. J. (1959). Beobachtungen über die "Schleimhauterkrankung" (Mucosal-Disease) der Rinder in Deutschland. **[Observations on mucosal disease in Germany.]**—*Dtsch. tierärztl. Wschr.* **66,** 149-151. [Summary in English.] **2454**

Mucosal disease of cattle is reported in Germany for the first time. It was diagnosed on clin. and P.M. findings in calves 6–12 months old in 3 herds in Holstein.—M.G.G.

I. Thienpont, D., Huygelen, C., Mortelmans, J., Biche, Y. & Pinckers, F. (1958). Existence chez les bovidés du Ruanda-Urundi d'une dermatose infectieuse associée à une stomatite ulcéreuse. **[An infectious dermatitis of bovines associated with an ulcerous stomatitis in Ruanda-Urundi.]** — *Bull. epiz. Dis. Afr.* **6,** 295-306. [In French. Summary in English p. 273.] **2455**

II. Huygelen, C., Mortelmans, J., Thienpont, D., Biche, Y. & Pinckers, F. (1958). **Transmission experiments with a virus causing dermatitis and ulcerative stomatitis in cattle in Ruanda-Urundi.**—*Zbl. VetMed.* **5,** 859-870. [In English. Summaries in French, German and Spanish.] **2456**

I. A form of infectious ulcerative stomatitis and dermatitis in an indigenous heifer and a bullock was at first thought to be sweating sickness. Both animals were in poor condition, there was inappetence, pyrexia, sensitivity to light, eczema, thick, non-elastic skin, erosive ulceration with or without membrane or scab formation on mucous membranes of mouth, nostrils and eyes. It did not respond to chloramphenicol and antihistamine treatment. No visceral lesions were seen P.M. There was a certain resemblance with a condition described by Dormael in the Belgian Congo in 1941, and another known as "pseudo-foot-and-mouth disease" in the Union of South Africa, attributed by some authors to infection with bluetongue virus [(Bekker *et al.*; Nieschulz *et al.*) *V.B.* **5,** p. 75], which was disputed by others [(Mason & Neitz) *V.B.* **12,** pp.579 & 583].

II. Transmission experiments with blood, tick and scab material from a naturally infected heifer by either s/c, i/v or intralingual infection were carried out in 7 calves, 21 sheep and 5 goats. Generally the disease took a subacute or chronic course. None of the experimental animals developed generalized skin lesions, but in nearly all there was ulcerative stomatitis and, in some, lesions on muzzle and legs. Seven sheep died but most of them were in poor condition resulting from heavy helminth infestation. In goats the disease took a chronic course and all except one died. Sheep and goats appeared to be more susceptible than calves, and crossbred more than indigenous calves. P.M. there was mesenteric oedema and a serous transudate was present in pericardium, thorax and abdomen. The virus was isolated on chick embryos and resembled in certain respects those of the pox group. Three healthy goats housed with two experimentally infected ones developed the disease and an unweaned calf transmitted the disease to its dam's udder. The condition in contrast to sweating sickness, was transmissable by direct inoculation. Absence of bluetongue antibodies was demonstrated by serum neutralization.—E.G.

McFerran, J. B. (1958). **ECBO viruses of cattle.**—*Vet. Rec.* **70,** 999. **2457**

During 1957 and 1958 in N. Ireland 112 cytopathogenic agents were isolated from bovine faeces in embryo calf kidney culture: the specimens were taken from 4 herds which showed no signs of clinical disease. These 112 agents fall into at least 3 serological types as judged by virus neutralization tests in tissue culture. One of the virus types VG(5)27 was serologically indistinguishable from LC R4 ECBO virus isolated in America.—E.V.L.

Moll, T. & Davis, A. D. (1959). **Isolation and characterization of cytopathogenic enteroviruses from cattle with respiratory disease.** —*Amer. J. vet. Res.* **20,** 27-32. [Authors' summary modified.] **2458**

Six strains of cytopathogenic enterovirus were isolated from the faeces of cattle with histories of respiratory disease or abortion. All affected animals in one herd developed antibody titres after recovery. The six viruses fall into two serological types. Both types were inhibited in tissue culture-neutralization tests by convalescent sera against bovine rhinotracheitis and immune sera against enteric cytopathogenic bovine orphan virus. The viruses seem unique in the wide range of species for whose cells they are

pathogenic *in vitro* without adaptation (*i.e.*, bovine, porcine and monkey kidney, human amnion and kidney, HeLa cells).

KLEIN, M., EARLEY, E., FRANKEL, J. & ZELLAT, J. (1959). **Isolation of a bovine virus neutralized by human gamma globulin and sera.** —*Fed. Proc.* **18,** 577. [Authors' abst. modified.] **2459**

A virus was isolated from the faeces of a normal cow in calf kidney tissue culture. The virus grew to a low titre (10^{-3} TCD per 0·1 ml.) with a characteristic inclusion body in calf kidney and calf testes tissue cultures. Growth was poor in monkey kidney tissue cultures. No growth was observed in adult or unweaned mice, chick embryos, or HeLa cells. The agent did not agglutinate human 'O', chick, bovine, sheep or g.pig red blood cells. No haemadsorption was observed in infected calf kidney cultures. The agent was neutralized by 4 different lots of human gamma globulin at a final dilution of approx. 1:320. 35% of individual human sera neutralized the agent in dilutions ranging from 1:4 to 1:16. No neutralization was observed with antisera against adenoviruses; Coxsackie B viruses; ECHO viruses; haemadsorption viruses; influenza viruses A, B, swine, Asian; Herpes simplex; B virus; mumps virus and poliovirus. This unidentified bovine virus is identical with or antigenically closely related to a virus that commonly infects man.

RIBEIRO, J. M. & NORONHA, F. M. O. (1958). Fièvre catarrhale du mouton au Portugal. (Blue Tongue). (Aspects de la maladie en 1957; action pathologique sur l'embryon de poulet; action cytopathogénique du virus sur la culture des tissus et étude de l'électrophorèse libre dans le sérum des animaux malades). **[Blue-tongue in Portugal. Study of the virus.]**—*Bull. Off. int. Epiz.* **50,** May. pp. 46-64. [Summary in English.] **2460**

An account is given of bluetongue in Portugal in 1957–58. Successful control is attributed to vaccination of non-infected in-contact sheep. The virus was subjected to pathogenicity tests and to electrophoresis. In chick embryo it caused degenerative phenomena and changes in the haemopoietic system resulting in altered metabolism and stunted growth. Its pathogenicity for kidney cells was similar to that of other strains of bluetongue virus. In the serum of experimentally infected sheep there was a marked increase in the γ-globulin fraction.

—T.E.G.R.

TOZZINI, F. (1959). L'epizoozia di febbre catarrale ovina (blue tongue) nella penisola iberica. **[The bluetongue epizootic in Portugal and Spain.]**—*Zooprofilassi* **14,** 55-57. **2461**

The 1956 outbreak of bluetongue in Portugal and Spain is discussed, mainly from the point of view of control—based on immunization with a chick embryo-adapted vaccine. It is stated that the disease was probably introduced into Portugal from Africa as the causal virus was identified as the South African "Estantia" strain.—T.E.G.R.

MATUMOTO, M., NISHI, I. & SABURI, Y. (1958). Multiplication de la souche neurotrope du virus de la fièvre de la Vallée du Rift dans la rate et dans le foie de la souris. **[Multiplication of the neurotropic strain of Rift Valley fever virus in spleen and liver of mice.]**—*C. R. Soc. Biol., Paris* **152,** 1623-1626. **2462**

A neurotropic strain of Rift Valley fever virus was injected i/p into mice and demonstrated in the liver 15 days later and in the spleen 41 days later. It was also demonstrated in the blood for several days, even after the appearance of neutralizing antibodies. After ten serial passages in the spleen of mice inoculated by the i/p route it became as virulent as by the intracerebral route, and caused nervous symptoms.

—M.G.G.

HADDOW, A. J. (1958). **East Africa High Commission. East African Virus Research Institute Report, July 1957 – June 1958.** pp. 47. Nairobi: Govt. Printer. **2463**

Veterinary interest in this report lies chiefly with Nairobi sheep disease virus. This was recovered from two Blue Duiker (*Cephalophus caerulus*) which died in the Entebbe area. The virus, neutralized by Nairobi sheep disease immune serum, was recovered from spleen and mesenteric lymph node. Mice inoculated with heart and liver material developed an immunity.

Promising research into a vaccine from mouse-adapted brain-passaged Nairobi sheep disease was begun. Virus lethal for sheep underwent a number of changes after 110 passages in mice such that sheep vaccinated with $1{\cdot}3 \times 10^6$ mouse LD_{50} 110th passage virus withstood challenge with 1,500 LD_{50} first passage material. All controls died and sera of vaccinated sheep contained potent neutralizing antibodies to the virus. It has yet to be shown whether tick passage enhances the virulence of the virus.

Semliki Forest virus studies in mice, red jungle fowl (*Gallus bankiva*), and various local birds were also undertaken.

Over 200 hippopotamus sera were obtained and preliminary study indicated 'infection with several imporant viruses'.—J. H. DARBYSHIRE.

MÜLLER, R. H. (1959). Um surto de balanopostite em ovinos. **[An outbreak of balanoposthitis in rams.]** — *Arch. Inst. Pesq. vet. Finamor* 1956/57. **2,** 7-9. [In Portuguese. Summary in English.] **2464**

An account of an outbreak of balanoposthitis in rams in Brazil. The disease was due to a virus and responded to treatment with penicillin ointment.—T.E.G.R.

RIBEIRO, J. M., AZEVEDO, J. A. R., TEIXEIRA, M. J. O., BRAÇO FORTE, M. C., RODRIGUES RIBEIRO, A. M., OLIVEIRA NORONHA, F., GRAVE PEREIRA, C. & DIAS VIGARIO, J. (1958). Peste porcine provoquée par une souche différente (Souche L) de la souche classique. **[An atypical strain of swine fever virus in Portugal.]**—*Bull. Off. int. Epiz.* **50,** May. pp. 516-534. [Summary in English.] **2465**

An epizootic occurred in Portugal during March–August 1957, involving 433 herds comprising 16,457 pigs of which 6,103 died and the rest were slaughtered. The disease was first diagnosed as classical swine fever but its identity was put in doubt when hyperimmunized pigs (used for the production of swine fever serum) became infected. It was characterized by marked enlargement of the spleen, intense haemorrhagic gastritis, vascular congestion, thickening of the gall bladder and pulmonary oedema. It was caused by a filtrable virus similar to that of African swine fever described by Montgomery (1910). Attempts to produce a vaccine or an immune serum were unsuccessful. Serial transfer of the virus in pig testicular tissue on chorioallantoic membrane of chick embryo did not cause significant attenuation.—T.E.G.R.

GRISHENKOVA, A. S. (1958). **[Agar precipitation reaction for the laboratory diagnosis of swine fever.]**—*Proc. Lenin Acad. agric. Sci.* **23,** No. 6. pp. 35-37. [In Russian.] **2466**

G. used the agar diffusion method of Björklund (1952), at first with antigens prepared from a 1:5 saline suspension of lymph nodes, or blood, from infected pigs. Reactions with serum from healthy, infected or immune pigs and rabbits were studied and a line of precipitation specific for swine fever was recognized. Another antigen was prepared from a mixture of 0·5 ml. defibrinated pig blood with 2 ml. saline by centrifuging at 1,000 r.p.m. for 5 min. 0·1 ml. of the sedimented blood cells was washed and suspended in 0·5 ml. of 0·1% soln. of formol plus 2 ml. water. The eluent was used as antigen: preparations from normal pigs gave no precipitin line while those from pigs with swine fever gave one sharp line.—R.M.

SHOPE, R. E. (1959). **Hog cholera eradication.** —*J. Amer. vet. med. Ass.* **134,** 143-145. **2467**

This editorial article written by R. E. Shope appears to be based upon the unjustified assumption that the swine fever virus is "dependent" upon lungworms in the same way as malaria of man is "dependent" upon anopheline mosquitoes. The only evidence that the virus is "dependent" on the lungworms of pigs is work done by Shope [*V.B.* **28,** 2484] and it would seem to be necessary that this work be confirmed before the accepted and well tried methods of eradication of swine fever are to be revolutionized.

The article maintains that present methods are aimed at only half of the target and that probably the least vulnerable half. The other half being the lungworms and earthworms which Shope maintains are reservoir hosts of the virus. It reads like a piece of special pleading since it fails to make any mention of the fact that swine fever has been eradicated from a number of countries, *e.g.* Australia, New Zealand, Bulgaria and Ireland without any action having been taken against lungworms and earthworms. Canada too seems to maintain a state of near freedom from the disease without any attempt to deal with lungworms and earthworms.

The analogy drawn between malaria in man and swine fever in pigs is very far fetched. In one the only natural means of infection is the bite of the intermediate host while in the other the common everyday method of infection is by contact.

RUSSEFF, C. & BONTSCHEFF, N. (1958). Culture et modification du virus de la peste porcine chez le lapin par inoculation abdominale simultanée du tissu embryonnaire du porc. **[Propagation of swine fever virus in the rabbit.]** — *Bull. Off. int. Epiz.* **49,** 643-652. **2468**

The strain of virus was maintained, fully virulent for pigs, in 107 passages in series in rabbits, simultaneously injected i/p with porcine embryonic tissue. The virus was lost if embryonic tissue was not used; it was recovered in subsequent passages when the use of embryonic tissue was resumed. A modified strain was obtained at the 104th passage, in series, by i/v inoculation of a suspension of spleen of rabbits killed at the height of fever. This virus, in a 2%

suspension of spleen or liver of rabbits with a thermal reaction, is well tolerated by sensitive pigs, in which it engenders a solid immunity.
—T.E.G.R.

PEHL, K.-H. & SCHULZE, W. (1958). Der Virusgehalt blutfreier Organe bei der Schweinepest. **[Virus content of blood-free organs in swine fever.]**—*Arch. exp. VetMed.* **12,** 861-869. **2469**

Pigs infected with swine fever virus between 15 hours and 6 days previously were anaesthetized and bled from the jugular vein while the circulation was washed out with Ringer's soln. (about 120 litres per pig) introduced into the left ventricle, to remove as much blood as possible from the organs. In liver, kidney, spleen, pancreas, muscle and bone marrow the virus did not appear until about 48 hours after infection, and the titre was relatively low; it was concluded that primary multiplication of the virus did not occur in these organs. On the other hand, virus was present from the 15th or 24th hour onwards in the lymphatic system and in the walls of blood vessels. Since the titre of vascular endothelium was about half that of blood and rather higher than that of the lymphatic system, it was believed that this tissue played a special role in the proliferation of the virus, but further studies would be necessary to clarify this.—R.M.

MIHĂIŢĂ, S., NICA, A., ALBOIU, M., CORMUŞ, D. & DE SIMON, M. (1958). Incercări de preparare pe porc a serului bivalent antipestos şi antirujetic. **[Preparation of a bivalent serum against swine fever and swine erysipelas.]** — *Lucr. ştiinţ. Inst. Pasteur, Bucureşti* **3,** 119-127. [In Roumanian. Summaries in French, German and Russian.] **2470**

Details were given of the preparation of a bivalent serum produced in pigs by simultaneous hyperimmunization against swine erysipelas and swine fever. The immunizing dose against swine erysipelas was 0·03 ml. for mice and 0·15 ml. for pigeons, that against swine fever 0·20 ml./kg. body weight. Simultaneous action of swine fever and swine erysipelas antigen had no adverse effect on antibody production.—E.G.

GHEORGHIU, I., ALBU, T., STANCA, M. & NIŢOIU, I. (1958). Intensitatea imunităţii active antipestoasă şi antirujetică la porc, în urma vaccinării concomitente. **[Intensity of active immunity against swine fever and swine erysipelas following simultaneous vaccination.]** — *Lucr. ştiinţ. Inst. Pasteur, Bucureşti* **3,** 221-230. [In Roumanian. Summaries in French, German and Russian.] **2471**

Immunity to swine fever was complete in 34 pigs vaccinated simultaneously with 20 ml. of formolized adsorbed swine fever vaccine and 0·5 ml. of avirulent swine erysipelas vaccine, but intensity of immunity to swine erysipelas varied. Of 33 pigs vaccinated 18 were immune, 11 developed localized lesions and 4 septicaemia following challenge with virulent swine erysipelas culture. Vaccination against swine erysipelas alone protected all 25 pigs vaccinated. An interval of at least two weeks between vaccinations was recommended in preference to simultaneous vaccination.—E.G.

MAYR, A. & WITTMANN, G. (1959). Antikörperuntersuchungen bei Schweinen nach Fütterung mit dem Virus der ansteckenden Schweinelähmung. **[Antibody studies in pigs after administration of Teschen disease virus in the food.]**—*Z. ImmunForsch.* **117,** 45-52. [Summaries in English, French, Spanish and Russian.] **2472**

26 pigs weighing between 18 and 25 kg. were each given 100 ml. of virus suspension of high titre. Seven developed paralysis after an incubation period of 9–22 days and 3 died. In pigs which developed symptoms, neutralizing antibodies appeared in the blood 1–2 weeks before precipitating antibodies, but both antibodies ran parallel courses. In pigs which did not develop symptoms the appearance of antibodies was sometimes the same as in paralysed pigs, while in other symptomless cases only small amounts of neutralizing antibody were present and there was no precipitating antibody.—R.M.

MAYR, A. (1958). Neue Ergebnisse der experimentellen Erforschung der ansteckenden Schweinelähmung (Teschener Krankheit, Poliomyelitis suum). **[Experimental research on porcine encephalomyelitis.]** — *Tierärztl. Umsch.* **13,** 319-324. **2473**

M. discussed cultivation of Teschen disease virus in trypsinized pig kidney tissue culture, the clin. picture, and diagnosis by histological examination of the c.n.s., and by the virus neutralization and the agar diffusion precipitation methods. He described preparation and evaluation of a vaccine consisting of 495 parts of tissue culture virus material of the 80–120th culture passage, purified with chloroform, 247·5 parts of borax–potassium diphosphate buffer, 247·5 parts of aluminium hydroxide and 10 parts of a 1:25 soln. of formalin in distilled water.—E.G.

MAYR, A. (1958). Abnahme der Pathogenität des Virus der ansteckenden Schweinelähmung durch Gewebekulturpassagen. **[Decrease in pathogenicity of Teschen disease virus after tissue culture.]** — *Mh. Tierheilk.* **10,** 186-191. **2474**

Pathogenicity for pigs of Teschen disease virus was considerably reduced by rapid passages in pig kidney tissue culture, without affecting its antigenic and immunizing properties. Susceptible young pigs infected intracerebrally with virus of the 90th and 91st passages remained free from clin. symptoms of the disease.—E.G.

MAYR, A. & WITTMANN, G. (1958). Serologische Untersuchungen bei Schweinen nach Impfung mit Kulturadsorbatvakzine gegen die ansteckende Schweinelähmung. **[Serological studies on pigs after inoculation of adsorbate vaccine against Teschen disease.]**—*Mh. Tierheilk.* **10,** 345-350. **2475**

Virus neutralizing and precipitating antibodies against Teschen disease were demonstrable in the serum of pigs after a single s/c dose of 5 ml. of adsorbed kidney tissue culture vaccine. 75% of those vaccinated resisted intracerebral challenge with virulent brain material. As a rule precipitating antibodies were demonstrable 1–2 weeks after the appearance of neutralizing antibodies, but their appearance did not depend strictly on the titre of the latter. Older pigs were better antibody producers than younger ones. Four groups of four pigs weighing about 15 kg. each were vaccinated with doses of 5 ml. of undiluted vaccine and similar doses of vaccine diluted with aluminium hydroxide in proportions of 1:2, 1:4 and 1:8, respectively. The difference in neutralizing antibody formation within these groups was insignificant. Precipitating antibodies, however, were demonstrable in all four pigs given undiluted vaccine and in three given the 1:2 dilution. Of the group given the 1:4 dilution one yielded a positive and one a doubtful precipitation reaction; of the 1:8 group one gave a positive precipitation reaction. A booster dose 48 days after the first increased both the virus neutralizing and the precipitating antibody titre.—E.G.

HARDING, J. D. J. (1958). **Inclusion body rhinitis of swine in Maryland.**—*Amer. J. vet. Res.* **19,** 907-912. [Author's summary modified.] **2476**

Lesions histologically indistinguishable from those of inclusion body rhinitis (IBR) were found in a herd of pigs in Maryland. The herd was known to be affected with atrophic rhinitis (AR).

Of 37 pigs, 13 to 77 days old, 9 (24-55 days old) showed lesions of IBR and 8 (35-62 days old) showed lesions of AR.

It is suggested that the causative agent of IBR is a member of the group of agents causing cytomegaly in man and a number of other animals, and may be a factor in the production of AR.

LAMONT, P. H. & BETTS, A. O. (1958). **Enteroviruses in the pig.**—*Nature, Lond.* **182,** 608-609. **2477**

Tissue culture techniques were used to determine whether viruses comparable to human enteroviruses occur in the alimentary tract of pigs. From 13 faeces samples, 3 immunologically distinct cytopathogenic agents were recovered. One agent isolated from pigs with a disease clinically similar to Talfan disease was neutralized by antisera to Talfan disease. A second virus from pigs with enteritis was studied in some detail. It caused a cytopathogenic effect in pig kidney cells similar to that produced by poliomyelitis in human or simian kidney cultures; the particle diameter was about 35 mμ. Attempts to produce a cytopathogenic effect in bovine kidney and HeLa cells and to adapt this virus to growth in embryonated hen's eggs were not successful and tissue culture fluids containing virus inoculated by various routes into pigs produced only a transient temperature rise and slight diarrhoea. Studies on the virus are being continued.—E.V.L.

BATEMAN, J. K. (1958). **Distemper complex.** —*Vet. Rec.* **70,** 981-982. **2478**

In a kennel of over 600 Greyhounds with an annual turnover of 1,200 additional dogs, the lowest number of distemper cases prior to the use of egg-adapted virus was 71 in 1950 and the highest 209 in 1947. During the 5 years 1954-1958, 931 puppies, 900 yearlings and 453 new entry adults (of doubtful history of vaccination) were immunized with avianized vaccine; not one of these animals has shown any sign of distemper or hard pad disease. A solitary case of distemper in an unvaccinated dog did not infect any other.—E.V.L.

VANTSIS, J. T. (1959). **Preliminary note on the propagation of canine distemper virus in different tissue-culture systems.** — *Vet. Rec.* **71,** 99-100. **2479**

The virus of canine distemper was successfully propagated in cultures of renal tissue from healthy and experimentally infected ferrets, in

cultures of pulmonary and renal tissue from naturally infected and healthy dogs, and in serial passage in cultures alternately of dog and ferret origin. The most susceptible culture tissue was healthy ferret renal tissue. Cytopathogenic effects which took from 3 days with material from acute cases to 5 weeks with material from advanced cases to appear, were best observed in fixed stained monolayers formed on cover slips. The picture closely resembled that of tissue cultures infected with the virus of measles.
—A. ACKROYD.

ŻUFFA, A. & ŠKODA, R. (1959). Použitie neutralizačného testu na kuracích zárodkoch pri štúdiu imunity po avianizovanom víruse psinky. **[Study of immunizing value of avianized distemper vaccine by a chick embryo neutralization test.]** — *Vet. Čas.* **8,** 17-26. [In Slovak. Summaries in English, French, German and Russian.] **2480**

Neutralization tests with graduated dog and ferret serum dilutions and fixed quantities of live avirulent avianized dog distemper virus were carried out. The neutralizing antibody titre reached its peak four weeks after vaccination with the virus, after which it decreased. Intracerebral challenge during the period of decrease produced a second peak, which was higher than that produced by s/c challenge. Active immunization in eight-week-old puppies, of vaccinated dams failed. Standardization of the technique of the neutralization test was discussed.
—E.G.

YEU, F. & RECULARD, P. (1959). Détoxication et purification du sérum anti-virus de Carré équin obtenu par injection d'organes virulents de furet. **[Detoxication and purification of horse anti-distemper serum, obtained after injection of virulent tissue from ferrets.]** —*Ann. Inst. Pasteur* **96,** 333-342. [Summary in English.] **2481**

Hyperimmune serum against distemper was prepared in horses inoculated with material from infected ferrets. After a few months the horses yielded serum that was toxic for dogs. The serum was detoxicated and purified by precipitating with 28% (dry wt.) of ammonium sulphate and heating to 62° C. at pH 8·7 in the presence of activated carbon.—M.G.G.

ADAMS, J. M., IMAGAWA, D. T., CHADWICK, D. L., GATES, E. H. & SIEM, R. A. (1958). **Relationship of measles and distemper.**—*J. Dis. Children* **95,** 601-608. **2482**

The pathological and immunological relationship of measles and distemper was supported by an illustrated account of lesions and by neutralization tests in tissue culture and ferrets. Mouse-adapted distemper virus was completely neutralized in unweaned mice by specific measles antiserum. [See also *V.B.* **28,** 444.]
—R.M.

BECH, V. (1959). **Canine hepatitis virus: attempts to find relationship with human hepatitis.**—*Proc. Soc. exp. Biol., N.Y.* **100,** 135-137. [Author's summary modified.] **2483**

Growth and behaviour are described of a strain of canine hepatitis virus in various tissue culture systems of human and animal origin. No antigenic relationship was demonstrated between this virus and the infectious agent of human hepatitis in neutralization, c.f., and haemagglutination inhibition tests with sera from patients with acute hepatitis and from convalescing patients.

RASPINI, J. M. (1958). A propósito de una posible virosis de los conejos. **[A fatal disease of rabbits, with exanthema of lips, mouth and face, probably caused by a virus.]**—*Rev. Vet. Milit., B. Aires* **5,** 243-246. **2484**

A disease of lab. rabbits aged 30–50 days was invariably fatal within 12–18 days. It commenced with the formation of exudate on the lips and an exudative lesion formed which spread to the face and backwards under the jaw to the chest. No other lesions were found, except ascites in some cases. Bacteriological examinations were negative. The disease was transmitted by inoculating young rabbits with 1–5 ml. of a ultrafiltrate of brain, liver, kidney and spleen from affected animals. A killed vaccine was prepared from these organs, and it protected rabbits from experimental infection between 15 and 30 days after vaccination. The disease died out after vaccination and hygienic measures, and had not recurred 9 months later.—R.M.

DALMAT, H. T. (1959). **Arthropod transmission of rabbit fibromatosis (Shope).** — *J. Hyg., Camb.* **57,** 1-30. [Author's summary modified.] **2485**

Aedes aegypti, A. triseriatus, Culex pipiens, C. quinquefasciatus, and *Anopheles quadrimaculatus* were all efficient experimental vectors of Shope's virus-induced fibromas of cottontail rabbits. Reduviid bugs and the bedbug, *Cimex lectularius,* were also capable of transmitting fibroma by interrupted or delayed feeding.

Transmission was mechanical, the virus being extremely stable in the insects. To transmit fibromas arthropods must draw virus up between the stylets of the mouthparts; mosqui-

toes were unable to transmit by feeding through skin moistened with a suspension of fibroma virus or by feeding subsequent to having their mouthparts painted with a virus suspension.

While cottontail tumours at peak virus titres are always infective for suitable insects, the fibromas of adult domestic rabbits generally are not infective, even though the virus titre is equivalent. However, the tumours of unweaned domestic rabbits do become infective for insects.

EDDY, B. E., STEWART, S. E., KIRSCHSTEIN, R. L. & YOUNG, R. D. (1959). **Induction of subcutaneous nodules in rabbits with the SE polyoma virus.** — *Nature, Lond.* **183,** 766-767. **2486**

32 rabbits less than one day old were injected s/c in the nuchal area with 1 ml. each of undiluted virus of 5 different sub-lines. 13–64 days later, 19 rabbits developed subcutaneous nodules, most of which were discrete, small and hard, while some were large and filled with fluid; histological examination revealed a resemblance to fibromata in man. The nodules disappeared when the rabbits were 93–134 days old. The virus produced malignant growths in mice, hamsters and rats; humoral antibodies have so far been demonstrated in rabbits, mice and hamsters.—E.V.L.

COOK, J. E. (1958). **Salivary-gland virus disease of guinea pigs.**—*J. nat. Cancer Inst.* **20,** 905-909. [Author's summary modified.] **2487**

Salivary-gland virus disease of guinea-pigs is apparently mild and specific for its natural host. Its presence is readily detected by microscopic examination of tissue from diseased salivary glands in which the characteristic hypertrophy and intranuclear inclusion bodies are observed in the cells of the ductal epithelium.

WATERSON, A. P. (1959). **Effect of neutral red on plaque formation by fowl plague virus.**—*Nature, Lond.* **183,** 628. **2488**

Neutral red reduced the number and size of plaques formed by fowl plague virus in Petri dishes of chick embryo cells. There was a critical relation between the quantity of neutral red and the cell numbers, and the reduction in plaque numbers was proportional to the concentration of neutral red. The effect was much smaller if the stain was not added until 3 days after the beginning of the assay experiment.—E.V.L.

VRTIAK, O. J., BARTÍK, M. & HRUŠOVSKÝ, J. (1959). Štúdium hemolytickej aktivity vírusov moru hydiny. **[The haemolytic activity of Newcastle disease and fowl plague viruses.]** —*Vet. Čas.* **8,** 27-34. [In Slovak. Summaries in English, French, German and Russian.] **2489**

Haemolytic activity of one American and three Slovak strains of Newcastle disease virus and of one German fowl plague virus was studied. Haemolytic activity increased, but the haemagglutination titre was reduced, after dialysis of allantoic fluid in distilled water, repeated freezing and thawing, centrifugation, and dilution of supernatant fluid with a soln. containing phosphate buffer, saline and potassium oxalate. The degree of haemolysis of a fowl r.b.c. suspension was determined by photoelectric colorimetry. The American strain had the highest, the fowl plague virus the lowest haemolytic effect. A commercial Hertfordshire antiserum inhibited both haemagglutination and haemolysis by one of the indigenous strains. Possible application of these findings for typing of strains was discussed.—E.G.

HESS, E. (1958). Prophylaxe und Bekämpfung der Newcastle-Disease in der Schweiz. **[Prophylaxis and control of Newcastle disease in Switzerland.]** — *Tierärztl. Umsch.* **13,** 314-317. **2490**

In Switzerland systematic inspection of imported poultry carcasses and compulsory slaughter of infected flocks reduced the incidence of new outbreaks of Newcastle disease from 377 in 1947 to 31 in 1948, at about which level it remained up to 1957. New outbreaks were confined mainly to districts bordering neighbouring states. Recent modifications in the clin. picture of the disease lead to difficulties in enforcing the stamping-out policy and a state compensation system was introduced. Vaccination against Newcastle disease is illegal.—E.G.

GAGLIARDI, G. & IRSARA, A. (1958). Isolamento dagli organi di pulcino del virus della pseudopeste somministrato con l'acqua di bevanda. **[Recovery of virus from organs of chicks given Newcastle disease vaccine in drinking water.]**—*Vet. ital.* **9,** 935-944. [Summaries in English, French and German.] **2491**

Strain F vaccine (Asplin's) was administered to chicks in the drinking water. The virus rapidly disappeared from the oral cavity and reappeared 12–48 hours after administration. The number of chicks from which virus was recovered varied directly with the conc. of virus in the vaccine. Virus development occurred mostly in the oro-pharyngeal mucosa, less frequently in the laryngo-tracheal mucosa, exceptionally in the lungs and not at all in the spleen.

There was an inverse relationship between egg-transmitted haemagglutination inhibition titres and virus multiplication in the oral mucosa.
—T.E.G.R.

ZUSCHEK, F., HANSON, R. P. & BRANDLY, C. A. (1959). **Influence of temperature on the growth of Newcastle disease virus in chorioallantoic membranes suspended in Tyrode's solution.**—*Amer. J. vet. Res.* **20,** 111-115. **2492**

The maximum rate of growth of Newcastle disease virus (Roakin) in tissue cultures of chorioallantoic membranes suspended in Tyrode's fluid occurred at 42°C. No growth occurred at 25°C. or below or at 45°C. or above. Between these temperatures, growth reached a maximum level in 48 hours. A log. linear response to temperature was observed after 36 hours of incubation. Haemagglutinin activity was not obtained in tissue cultures at any temp. but in embryonating eggs it followed a log. linear response to temp. Differences in the growth patterns and rates of growth at different temperatures between different strains were not observed.—A. ACKROYD.

SUHACI, I., URSACHE, R. & POPA, E. (1958). Vaccinarea mixtă contra variolei şi pseudopestei aviare. **[Combined fowl pox–Newcastle disease vaccine.]**—*Lucr. ştiinţ. Inst. Pasteur, Bucureşti* **3,** 179-194. [In Roumanian. Summaries in French, German and Russian.] **2493**

A good immunological response against both diseases was obtained with a mixed vaccine prepared from attenuated, chick-embryo-grown fowl pox and Newcastle virus, applied either by the feather follicle or the stick method.
—E.G.

LUTTRELL, C. N. & BANG, F. B. (1958). **Newcastle disease encephalomyelitis in cats. I. Clinical and pathological features.**—*Arch. Neurol. Psychiat., Chicago* **79,** 647-657. **2494**

Kittens and adult cats were successfully infected by several routes with N.D. virus. Dissemination of the virus within the central nervous system was studied. Myoclonus resulted from a lesion at the level of the brain stem or in the spinal cord.—R.M.

AGRIMI, P. (1958). L'epatite virale delle anatre (Levine e Fabricant 1950). Segnalazione di un episodio. Identificazione del virus e prove di trasmissione sperimentale. **[An outbreak of virus hepatitis of ducks. Identification of virus and transmission experiments.]**—*Zoo-profilassi* **13,** 541-551. [Summaries in English and French.] **2495**

An account is given of virus hepatitis in 300 ducks, aged 10–12 days, with a mortality of about 90%. The outbreak was sudden in onset and lasted 3–4 days. Symptoms and lesions are described. The causal virus, isolated by inoculation of liver and spleen suspension into the chorio-allantoic cavity of 10-day-old chick embryos, was identified by neutralization tests.
—T.E.G.R.

JAKUBÍK, J. & GOIŠ, M. (1959). Vírusová hepatitída kačíc. **[Virus hepatitis in ducks.]**—*Vet. Čas.* **8,** 48-53. [In Slovak. Summaries in English, French, German and Russian.] **2496**

High mortality in ducklings in Slovakia during 1958, and clin. and P.M. findings, suggested the presence of virus hepatitis, but attempts to isolate the virus in chick embryos failed. Other causes of death were salmonellosis and psittacosis.—E.G.

POLLARD, M. & STARR, T. J. (1959). **Propagation of duck hepatitis virus (DHV) in cultures of chick embryo explants.**—*Fed. Proc.* **18,** 501. [Authors' abst. modified.] **2497**

DHV was assayed in 7-day-old embryonated hen eggs. It survived storage in cell-free culture medium (pH 7·2) for 21 days at 37°C. Thereafter, virus recovery was irregular. DHV survived overnight storage at 4°C. with one-third volume di-ethyl ether. The tissue culture (TC) system consisted of 7-day-old chick embryo minced explants in nutrient medium of balanced salt solution with 10% heat-inactivated chicken serum. During 20 serial TC passages, made at 6 day intervals, an estimated 10^{28} infectious virus particles were produced. This level exceeded the 10^6 virus particles in the original inoculum. Ten LD_{50} of virus were sufficient to infect the TC system. Cytopathogenic effect was noted irregularly after passage 16. Inclusion bodies were not noted. DHV was produced by infected TC after 5 successive changes of nutrient medium at 6 day intervals. The virus did not propagate in cultures of HeLa, human fibroblast, mouse 'L', and trypsinized monkey kidney cells.

POLLARD, M. (1959). **Therapy of psittacosis-infected parakeets with chlortetracycline.**—*Antibiot. & Chemother.* **9,** 23-26. [Summary in Spanish p. 61. Author's summary modified.] **2498**

Within the limits of sensitivity of the virus detection technique used, one i/m inj. of 20 mg. chlortetracycline hydrochloride in sesame oil rid 108 parakeets of psittacosis virus. 25 of 43 untreated birds from the same flocks harboured

the virus. It seems that the drug reservoir in the pectoral muscle reached its maximum effect 5 days after injection, since all treated birds were thereafter negative for the virus.

ROTT, R. & ROOTS, E. (1958). Eignung des komplementbindenden Antigens aus gereinigtem Psittakose-Virus als Allergen bei infizierten Hühnern. **[Suitability of a complement-fixing psittacosis antigen, prepared from purified virus, as allergen for a wattle test in fowls.]** — *Zbl. VetMed.* **5,** 871-876. [Summaries in English, French and Spanish.] **2499**

A complement-fixing antigen produced by repeated freezing and thawing of purified psittacosis virus concentrate was used in doses of 0·1 ml. as allergen in a wattle test in fowls. In experimentally infected fowls the swelling reached its peak after 24 hours and disappeared in about 5 days. Non-specific reactions disappeared within 24 hours. Healthy fowls did not become sensitized by repeated injection of the allergen.—E.G.

GRABER, R. E. & POMEROY, B. S. (1958). **Ornithosis (psittacosis); An epidemiological study of a Wisconsin human outbreak transmitted from turkeys.** — *Amer. J. publ. Hlth.* **48,** 1469-1483. **2500**

Ornithosis was confirmed serologically in 14 employees of a turkey processing plant with clinical, and in 9 with subclinical infection. In turkeys infection was mainly subclinical, but respiratory symptoms of short duration were observed in some. The virus was of low pathogenicity for turkeys and mice.—E.G.

GENEST, P. (1959). Transmission congénitale de la psittacose expérimentale chez la souris blanche. Note préliminaire. **[Congenital transmission of experimental psittacosis in mice. Preliminary note.]**—*Bull. Acad. vét. Fr.* **32,** 75-80. **2501**

A female mouse with latent psittacosis gave birth to 5 young. Latent psittacosis was demonstrated in the one male and in the offspring of 3 of the 4 females. It is considered that the embryos became infected at the beginning of development, before implantation of the placenta.—M.G.G.

GENEST, P. (1958). Les maladies animales du groupe de la psittacose. **[Disease of animals caused by the psittacosis-lymphogranuloma group of viruses.]** — *Canad. J. comp. Med.* **22,** 386-391. [In French. Summary in English.] **2502**

During the past few years various diseases caused by the psittacosis-lymphogranuloma group of viruses have been observed in cattle, sheep, goats, dogs and cats. Intercurrent infections in man have also been reported. These diseases in animals are characterized by nervous, respiratory, gastro-intestinal troubles and abortion. Mammals may constitute a new source of the psittacosis type of infections in man.

—C. L'ECUYER.

STAUB, H. (1959). Virusabort in einem Ziegenbestande. **[Abortion in goats caused by a virus of the psittacosis-lymphogranuloma group.]** — *Dtsch. tierärztl. Wschr.* **66,** 98-99. **2503**

Smears of mucus from the skin of an aborted goat foetus revealed elementary bodies similar to those of the virus of the psittacosis-lymphogranuloma group that causes abortion in sheep. The aborting goat and another in the same stable that had aborted a year previously were positive to the c.f. test with psittacosis antigen, but a cow was negative. Sera from 18 control goats were negative. The source of the infection is considered to have been sheep previously kept on the farm in the same stable, some of which aborted.—M.G.G.

OMORI, T., MORIMOTO, T., INABA, Y., ISHII, S. & MATUMOTO, M. (1958). **Miyagawanella: psittacosis-lymphogranuloma group of viruses. 8. Tetracycline and chlortetracycline treatment of goats perorally infected with goat pneumonitis virus in special reference to eradication of fecal virus.**—*Jap. J. exp. Med.* **28,** 405-412. [Authors' summary modified.] **2504**

Goats orally infected with goat pneumonitis virus were successfully treated with tetracycline, and the antibiotic completely eradicated the virus from infected animals. Similar results were obtained with chlortetracycline in a limited experiment. The disappearance of virus from the faeces of treated animals was emphasized in connexion with control of the disease in goats.

V. KERÉKJÁRTÓ, B. & HIERONYMI, B. (1958). Über die Vermehrung einiger tierpathogener Virusarten in Epithelzellkulturen von Schweineniere. **[Growth of some viruses pathogenic for animals in pig kidney epithelial cell cultures.]** — *Arch. ges. Virusforsch.* **8,** 469-479. **2505**

Cultivation of B virus and the viruses of Aujeszky's disease and herpes simplex in trypsinized pig kidney epithelial cell culture was successful. The titre of Aujeszky's virus and its pathogenicity for pig kidney cells increased after passage, as compared with the other two viruses in this group.—E.G.

FAUCONNIER, B. & BARUA, D. (1959). **Increase of viral haemagglutinability of red cells of the mouse after treatment with formalin.**—*Nature, Lond.* **183,** 629-630. **2506**

Certain viruses exhibited a rise in haemagglutination titre with mouse r.b.c. preserved by heating with formalin as compared with fresh mouse r.b.c. In particular, the 3 strains of influenza B, which agglutinate fresh mouse r.b.c. very poorly, agglutinated the formalin-treated r.b.c. to a high titre comparing favourably with that obtained with fresh fowl r.b.c. The process of preparation of formalin-preserved cells may enhance their haemagglutinability by lowering their surface charge.—E.V.L.

MCLAREN, A. & SANDERS, F. K. (1959). **The influence of the age of the host on local virus multiplication and on the resistance to virus infections.**—*J. Hyg., Camb.* **57,** 106-122. [Authors' summary modified.] **2507**

The simplest hypothesis which will accommodate the observed data on virus multiplication and on the development of resistance with age appears to be that the accessibility of the host cell to virus decreases with age. The authors found no evidence that the ability of the host cell to support virus multiplication declines with age.

GMITTER, J., NIŽNÁNSKY, F. & MAČIČKA, O. (1959). Koxielóza na Slovensku. II. Izolacia kmeňov *Coxiella burneti* z klieštov *Dermacentor marginatus* a *Haemaphysalis punctata.* [**Q fever in Slovakia. II. Isolation of *Rickettsia burneti* from *Dermacentor marginatus* and *Haemaphysalis punctata.***] — *Vet. Čas.* **8,** 35-39. [In Slovak. Summaries in English, French, German and Russian.] **2508**

R. burneti was isolated by inoculation of g.pigs with a suspension of *D. marginatus* and *H. punctata,* collected from pastured sheep and cattle in two districts of Slovakia. [See also *V.B.* **27,** 2413 & 3017.]—E.G.

See also absts. **2613** (diseases of Antarctic birds); **2615** (of game); **2706** (report); **2708-2710** (books).

IMMUNITY

BIER, M., DENIZ, N. & TEITELBAUM, P. (1959). **Experimental hypogammaglobulinemia.** — *Fed. Proc.* **18,** 192. **2509**

The condition is produced experimentally by a process called "selective plasmapheresis" (which is briefly described). Experiments on live sheep and dogs and on human blood, *in vitro,* showed that the method is widely applicable and offers possibilities in the study of blood proteins and of experimental immunology. A study of the relationship between circulating antibodies and skin homotransplants, by this method, is in progress.—T.E.G.R.

LAUFER, A., TAL, C. & BEHAR, A. J. (1959). **Effect of adjuvant (Freund's type) and its components on the organs of various animal species. A comparative study.**—*Brit. J. exp. Path.* **40,** 1-7. [Authors' summary modified.] **2510**

The changes were studied in organs of mice, g.pigs and hamsters inoculated with Freund's adjuvant or its components. Proliferative inflammatory lesions in the brain were observed only in hamsters given the complete adjuvant or its components. Similar reactions to the complete adjuvant on the part of the reticulo-endothelial system were seen in all 3 species in the liver, spleen and lungs, but not in the heart or kidneys. When each component was injected alone, the result varied according to the organ and species. Amyloidosis occurred in mice only and was seen in the liver, spleen and kidneys after injection of the complete adjuvant. When the components were injected singly the results varied with the component and the organ.

WOLOCHOW, H. (1959). **Fluorescent labels for antibody proteins. Application to bacterial identification.** — *J. Bact.* **77,** 164-166. [Author's summary modified.] **2511**

A fluorescent compound, 5-dimethylamino-1-naphthalene sulphonyl chloride, which is stable and requires no chemical treatment before use, was shown to be a replacement for fluorescein isocyanate as a labelling agent for specific immune sera, in tests for the identification of *Pasteurella pestis.* A microprojector is easily adapted for work with fluorescent antibodies.

COCHRANE, C. G. & WEIGLE, W. O. (1958). **The cutaneous reaction to soluble antigen–antibody complexes. A comparison with the Arthus phenomenon.**—*J. exp. Med.* **108,** 591-604. [Authors' summary modified.] **2512**

The *in vivo* activity of soluble antigen–antibody complexes was tested by a single i/d injection in rabbits. Skin reactions were erythema, induration, and occasionally haemorrhage and necrosis. Microscopically, diffuse inflammation and occasional vascular necrosis could be found with all dose levels. This indicates that soluble antigen–antibody complexes

are phlogogenic and supports the suggestion that complexes are responsible for the lesions seen in serum sickness.

The reactions were similar in severity to local passive Arthus (LPA) reactions at equal dosages of antibody in the dose range studied.

Bovine serum albumin antigen could be found in large concentrations in affected vessel walls of both reverse passive Arthus (RPA) and active or classical Arthus reactions. It is suggested that this predominantly vascular localization of antigen might bring about the relative severity of the RPA and active Arthus reactions, as contrasted to the complex and LPA reactions.

The finding of affected vessels in the complex and LPA reactions containing little or no antigen and antibody, while these components were present in adjacent areas, suggests that the antigen–antibody combination may cause vascular reaction and damage by the release of physiologically active mediators from the tissue or tissue fluid.

ISHIZAKA, K., ISHIZAKA, T. & CAMPBELL, D. H. (1959). **The biological activity of soluble antigen-antibody complexes. II. Physical properties of soluble complexes having skin-irritating activity.** — *J. exp. Med.* **109**, 127-143. [Authors' summary modified.] **2513**

Soluble complexes of bovine serum albumin and anti-albumin serum formed in excess of antigen, give immediate skin reactions in normal g.pigs. The mechanism of the reaction is not that of passive or reversed passive anaphylaxis. The complex itself is toxic [*V.B.* **28**, 3261]. Skin activity of the complex depends on its composition. A complex composed of two antigen molecules and one antibody molecule, (Ag_2Ab), does not have the activity, whereas Ag_3Ab_2 and more complicated complexes do. The authors discussed the role of complement and speculated on the structural changes of antibody–antigen complexes.

RICHTER, M., ROSE, B. & SEHON, A. H. (1958). **The significance of the number of precipitin bands in agar gel medium for the determination of the complexity of antigens.**—*Canad. J. Biochem. Physiol.* **36**, 1105-1113. **2514**

A new interpretation of the inconsistencies which may arise when comparing data obtained with antibody–antigen systems in agar and in liquid media. By the agar technique, not more than one antigenic moiety (present on a molecule) is detected, whereas, by the precipitin test in liquid medium, optimal proportion zones in respect of each of the antigenic moieties (on the molecule) may be detected. This effect is not due to a lesser sensitivity of the reaction in agar but rather to the inherent limitations of this method and does not detract from the value of the technique for the detection of independent antigens.

—C. L'ECUYER.

AUGUSTIN, R., HAYWARD, B. J. & SPIERS, J. A. (1958). **Antigen-antibody reactions in agar. I. Experimental tests of current theories of Oudin's single diffusion method.**—*Immunology* **1**, 67-80. **2515**

Experiments were carried out to test the accuracy of two different theories concerning the antibody–antigen complex precipitation in gel plates. Theoretical predictions were made according to a given equation as to the nature of the precipitation curve to be obtained in horse serum albumin or cystalline egg albumen in the presence of the corresponding rabbit antiserum globulin concentrates, and compared with the results of the experiments. Tests were made to determine the results of placing the antigen in the gel instead of the liquid phase, the influence of the meniscus on the diffusion process, the effect of absolute concentrations of reactants and the influence of the gel concentration.

It was found that the theory taking into account the diffusion of antigen and antibody, and the antigen–antibody interaction gave the more reliable results, and its possible application to related problems was suggested.

—W. E. PARISH.

TRNKA, Z. (1958). **Antibody formation by isolated cells of hen spleen after mixing with antigen *in vitro* and transfer to chicks.**—*Nature, Lond.* **181**, 55. **2516**

Infant animals incapable of elaborating an immune response to antigens may be used as recipients for studying antibody formation in mesenchymal cells sensitized to known antigens. In these experiments spleen cells from normal hens whose sera were free from agglutinating antibodies to *Salmonella paratyphi B* or *Brucella suis* were isolated and exposed *in vitro* to heat-killed suspensions of these two organisms for 10 min., and then injected i/p into chicks 48–56 hours old. Antibodies could be detected in the blood of the chick on the 5th day in the majority of the survivors. No antibody was detected in the controls at that time. It was further demonstrated that the transferred cells must be obtained from the same species.

—W. E. PARISH.

PIERCE, A. E. (1959). **Specific antibodies at mucous surfaces.**—*Vet. Rev. Annot.* **5**, 17-36. **2517**

P. discussed the occurrence, properties and

function of specific antibodies to bacteria, viruses, protozoa and helminths on mucous surfaces of the alimentary, respiratory, reproductive and urinary tracts and in the udder. There was reference to brucellosis, leptospirosis, vibriosis, trichomoniasis, influenza, *Haemonchus* and *Trichostrongylus* infestations, and other infections.—R.M.

BANGHAM, D. R., HOBBS, K. R. & TERRY, R. J. (1958). **Selective placental transfer of serum-proteins in the rhesus.**—*Lancet* August 16th, 351-354. **2518**

Pregnant rhesus monkeys (*Macaca mulatta*) within 4–6 weeks of the end of the gestation period were injected intravenously or into the amniotic cavity with homologous sera labelled with radio-iodine, and samples of the amniotic fluid or foetal blood were obtained at periods up to 24 hours later. The samples were fractionated on a cellulose column and the radioactivity measured, and they were also examined for their electrophoretic pattern.

It was found that there was direct transmission of albumin and γ-globulin to the foetus from the maternal circulation, and that the transfer is selective in that γ-globulin is transmitted 15–20 times more easily than the albumin, and other globulins do not appear to reach the foetal circulation. There was no transfer of the serum proteins *via* the amniotic fluid.

—W. E. PARISH.

SCHECHTMAN, A. M. & ABRAHAM, K. C. (1958). **Passage of serum albumins from the mother to the foetus.** — *Nature, Lond.* **181,** 120-121. **2519**

Rabbits pregnant 19 or 24 days were injected i/v with bovine or human serum albumin, and samples of maternal and foetal blood and other foetal fluids were taken at 1, 6, 24 and 48 hours after injection. Substances with the same antigenicity were then detected in the foetal fluids and which moved with the same electrophoretic characteristics as the original serum albumins.

The albumins could be found in the foetus within 1 hour of injection of the mother and increased in concentration during the 48 hours. Little or no protein was found in the fluids of amnion, allantois and stomach of the 19-day foetus, but high concentrations in the 24-day foetus. Further experiments indicated that the serum albumin can pass into the exocoele, bypassing the circulation of the yolk sac. Comparisons with the transplacental transfer of antibodies are discussed.—W. E. PARISH.

PAYNE, L. C. & MARSH, C. L. (1959). **Factors influencing absorption of gamma globulin in baby pigs.**—*Fed. Proc.* **18,** 118. [Authors' abst. modified.] **2520**

Blood levels of gamma globulin in baby pigs taken by hysterectomy, isolated and deprived of colostrum for 30 days averaged 0·223 g./100 ml. (0·29–0·15 g.) during this period. Levels for naturally farrowed unweaned pigs averaged 1·85 g./100 ml., decreasing from 3·30 g. on the first day to 0·46 g. on the last day. Porcine plasma gamma globulin (Cohn fraction II) was not absorbed during the first day of life, hence some material within colostrum must alter the permeability of the gut wall.

I. KIES, M. W., ALVORD, E. C., JR. & ROBOZ, E. (1958). **Production of experimental allergic encephalomyelitis in guinea pigs with fractions isolated from bovine spinal cord and killed tubercle bacilli.**—*Nature, Lond.* **182,** 104-105. **2521**

II. COLOVER, J. (1958). **Experimental allergic encephalomyelitis induced with combined 'purified' spinal cord and bacillary fractions.** —*Ibid.* 105-106. **2522**

I. A fraction of a partially defatted bovine spinal cord extracted with cold 5% potassium chloride was approx. 10 times as active in producing experimental allergic encephalomyelitis in g.pigs when administered with a fraction of the tubercle bacilli as whole freeze-dried cord on a dry weight basis, and 5 times more active than a collagen-like protein constituent also isolated from spinal cord. It is thus demonstrated that neither whole nerve tissue, nor whole tubercle bacilli, are essential to produce allergic encephalomyelitis.

II. A description of further experiments demonstrating that certain fractions of tubercle bacilli and nerve tissue together were sufficient to cause experimental allergic encephalomyelitis in g.pigs. A collagen-like protein II-B was prepared from bovine spinal cord, and, used with certain fractions of tubercle bacilli, including wax D Canetti, was active in producing allergic encephalomyelitis.—W. E. PARISH.

I. HUMPHREY, J. H. & MOTA, I. (1959). **The mechanism of anaphylaxis: observations on the failure of antibodies from certain species to sensitize guinea pigs in direct and reversed passive anaphylaxis.** — *Immunology* **2,** 19-30. **2523**

II. HUMPHREY, J. H. & MOTA, I. (1959). **The mechanism of anaphylaxis: specificity of antigen-induced mast cell damage in anaphy-**

laxis in the guinea pig. — *Ibid.* 31-43. [Authors' summaries modified.] **2524**

I. Using the criteria of generalized anaphylaxis, the Schultz-Dale test, and mast cell degranulation occurring on contact with antigen *in vitro*, a study has been made of the ability of antisera, prepared in various species, to sensitize g.pig tissues passively. Whereas small amounts of g.pig and rabbit antibodies and rather larger amounts of monkey, dog and human antibodies were effective, antibodies from goat, horse, rat, fowl and a human autoimmune thyroid antiserum were ineffective.

Using antibodies labelled with ^{131}I, no gross differences were found between those which sensitized and those which did not. By means of labelled antigen it was also shown that the antibody adsorbed on g.pig mesentery could combine equally well with antigen, whether the antibody came from rabbit (sensitizing) or rat (non-sensitizing). The amount of adsorbed antibody necessary for sensitization was very small.

Reversed passive anaphylaxis was studied with a variety of different antigen–antibody systems. It occurred only when the antigen was a gamma-globulin, and when both antigen and antibody globulins came from species whose antibodies were able to sensitize g.pigs for direct passive anaphylaxis.

Explanation of the differences between antibodies or antigens which sensitize g.pigs passively, and those which do not, is to be found in the nature of the antigen–antibody combination as well as in the manner of "fixation" on the tissues. The possible importance of ability to activate g.pig complement is discussed.

II. Mast cell damage, characterized by loss of granules, occurs when the tissues of sensitized g.pigs are brought into contact with antigen. The mast cell response to antigen is well correlated with the development of anaphylactic shock. After multiple sensitization, contact with different antigens caused cumulative but not complete, disappearance of mast cells.

Antigen–antibody interactions, in which antisera were from species which do not sensitize g.pigs passively for anaphylaxis, did not cause mast cell damage.

Reversed passive anaphylaxis and mast cell damage were elicited when the antigen was a suitable gamma-globulin, but not when it was an albumin. Antiserum against homologous gamma-globulin causes typical anaphylaxis and mast cell degranulation, whereas antiserum against Forssman antigen causes capillary damage without mast cell changes and antiserum against homologous albumin is ineffective.

Mast cell damage may occur as a result of antigen–antibody interaction, when one of the reagents is reversibly adsorbed at the mast cell surface, and when they are together capable of activating some process or agent whose further action depends upon the metabolic integrity of the cells.

SOBEY, W. R. & ADAMS, K. M. (1959). **The inheritance of anaphylactic sensitivity in mice using bovine plasma albumin as an antigen.** —*Immunology* **2**, 93-95. [Authors' summary modified.] **2525**

Using bovine plasma albumin as an antigen, anaphylactic sensitivity was found to be highly heritable.

See also absts. **2312 & 2313** (staphylococcal mastitis); **2315** (experimental staph. infection); **2317** (antistreptolysin and staphylococcal antitoxin in serum); **2336** (TB.); **2343** (diptheria); **2345** (E. rhusiopathiae); **2364** (salmonella); **2378** (Cl. welchii); **2399 & 2400** (contagious agalactia); **2405** (trypanosomiasis); **2415** (toxoplasma antigen); **2419 & 2422** (F. & M. disease vaccines); **2427-2429** (F. & M. disease); **2434** (rabies); **2435** (adsorbed rabies vaccine); **2436** (rabies virus haemagglutination); **2447** (horsesickness); **2448** (c.f. test, equine virus abortion); **2451 & 2452** (rinderpest vaccine); **2470 & 2471** (swine fever and erysipelas); **2472** (Teschen disease); **2475** (Teschen disease vaccine); **2480** (avianized distemper vaccine); **2481** (anti-distemper serum); **2493** (combined fowl pox-Newcastle disease vaccine); **2499** (c.f. test, psittacosis); **2544** (self-cure, H. contortus); **2553** (immunity in helminth infections); **2557** (interference phenomenon in bovine leucosis); **2558** (leucaemia); **2706** (report).

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

I. KHATIN, M. G., LUR'E, M. Z., KOLOMIETS, Y. M. & SOLOV'EV, V. P. (1959). **[Use of chlorophos against warble-fly larvae in cattle.]**—*Veterinariya, Moscow* **36**, No. 2. pp. 82-85. [In Russian.] **2526**

II. POTEMKIN, V. I. & GIL'DENBLAT, A. A. (1959). **[Use of chlorophos in warble-fly infestation of cattle.]**—*Ibid.* pp. 86-87. [In Russian.] **2527**

III. YANOVICH, G. I. (1959). **[Chlorophos in the control of warble-fly larvae in cattle.]**—*Ibid.* p. 87. [In Russian.] **2528**

I. Chlorophos ("Dipterex") controlled warbles on 3,500 cattle when applied to the skin in April or the beginning of May. 1·5% or 2% aqueous solutions were used, to which was added 1% "OP", a surface-active agent with emulsifying properties. Most animals needed only one treatment. No warbles appeared in 2 groups of 28 and 31 calves treated orally between October and January with 3 doses each of 100 mg. of chlorophos per kg. body wt. in 10% aq. soln. In 2 control groups calves had an average of 16 and 8 warbles each. A few

warbles appeared in calves given doses of 75 mg./kg., but these were destroyed by a single external application of 1·5% chlorophos with 1% "OP".

II. Cattle with warble infestation were sprayed with different concentrations of chlorophos from April to June. 3% aq. soln. killed 91% of larvae in 25 cattle, 4% aq. soln. killed 97% in 105 cattle, and 5% aq. soln. killed 98% in 28 cattle. A 4% aq. soln. is recommended, treatment being repeated every 30 days until new larvae cease to appear. S/c injection of 17 or 20 mg. of chlorophos per kg. body wt. in mid-January did not destroy migrating larvae.

III. On the 8th of March 78 yearling calves were inoculated s/c with 15 mg. of chlorophos in 10% aq. soln. per kg. body wt. The dose was repeated 23 days later. 97·2% of larvae were destroyed. On the 12th of March 3% aq. soln. of chlorophos was brushed on to the backs of 70 yearling calves, and again 25 days later. 99% of larvae were destroyed.—M.G.G.

BEHRENZ, W. (1959). Biologische Bestimmung des Wirkstoffgehaltes im Fleisch von Schafen und Rindern zu verschiedenen Zeiten nach peroraler Behandlung mit Neguvon. [**Biological assay of "Neguvon" in meat from sheep and cattle, killed at various times after oral administration of the drug.**] — *Arch. Lebensmittelhyg.* **10**, 64-67. **2529**

The maximum concentration of "Neguvon" in muscle occurred an hour after oral administration. The drug could not be detected in muscle 4–6 hours after administration.—R.M.

GREGSON, J. D. (1958). **Tick paralysis in cattle in British Columbia in 1957.**—*Proc. ent. Soc. B. C.* **55**, 6-7. [Author's summary modified.] **2530**

In 1957, four outbreaks of paralysis in cattle were caused by *Dermacentor andersoni*. In herds of 300, 118, 700, and 70 yearlings, 10, 32, 320, and 14 animals respectively were paralysed, with losses of 3, 7, 30, and 0. The outbreaks were favoured by a combination of prolonged tick activity and insufficient protection by BHC sprays due to showery weather and inadequate dosage. Most affected animals recovered after the ticks had been removed by comb or killed with petroleum oil, coal oil and/or BHC.

I & II. THEILER, G. & SALISBURY, L. E. (1958). **Zoological survey of the Union of South Africa. Tick survey: part X.—Distribution of *Margaropus winthemi*, the winter horse tick. Part XI.—The distribution of *Otobius megnini*, the spinose ear tick.**—*Onderstepoort J. vet. Res.* **27**, 599-604 & 605-610. **2531**

I. The tick *M. winthemi* was at one time thought to have been introduced with horses from the Argentine, but it is now known to be indigenous to South Africa. It is a one host tick showing a preference for horses, though it also attacks cattle. It is active during winter. Unfortunately in many areas few or no winter collections were made. It is present in thorn country (though absent from Bechuanaland and the Kalahari proper), in all three grasslands and in some of the desert shrub areas. It is absent from forest areas and the parklands of the Bankenveld, Limpopo Highlands and the lowveld of the North Eastern and Eastern Transvaal and Mozambique. It is consistently absent from winter rainfall areas though it may be present in areas, *e.g.* Albany, having both winter and summer rainfall. Excessive rain seems to be the main limiting factor, 30 inches or more annually. It is also absent from the hot dry areas of S.W. Africa, Bushmanland and parts of the Karoo. It has not been recorded from other parts of Africa.

II. *O. megnini* is an introduction from America which has become established in many parts of the Union of South Africa; it seems that *O. megnini* has not yet been introduced into all areas where it could establish and maintain itself. It shows no seasonal periodicity, neither temperature nor altitude appears to play a limiting role in its distribution, the tick is most abundant in the Karoo where the rainfall is low and tends to become less abundant in areas of higher rainfall, and is absent from areas with over 40 inches annually. There is evidence that *O. megnini* can be controlled with weekly dipping but persists on farms with no or only fortnightly dipping. It is present throughout the three grasslands, the desert shrub areas and some of the parklands, though absent from the evergreen and deciduous bush and the subtropical forest fringing the east coast, from the temperate evergreen forest as also from the subtropical evergreen and deciduous tree and thorn forest extending from Zululand into Mozambique and the North Eastern Transvaal. As yet there are few records from South West Africa. Here conditions in many parts would be favourable for its establishment when once it is introduced.

FIEDLER, O. G. H. (1958). Die Bekämpfung der Rinderzecken in Südafrika. [**Control of cattle ticks in South Africa, with special reference to the use of "Asuntol" (Bayer**

21/199).]—*Vet.-med. Nach.* No. 3. pp. 133-146. **2532**

Trials in South Africa with "Asuntol", a chlor-coumarine-thiophosphoric acid ester, known also as Bayer 21/199, for the eradication of *Boophilus decoloratus, Amblyomma hebraeum, Rhipicephalus appendiculatus, Rh. evertsi* and *Hyalomma* species on cattle were highly satisfactory. Weekly spraying with a 200–400 p.p.m. soln., or dipping with sodium arsenite and "Asuntol" in a conc. of 200 p.p.m., killed all ticks on cattle. For over two years the parasiticide had no adverse effect on cattle.—E.G.

SWEATMAN, G. K. & PULLIN, J. W. (1958). **Toxicity of lindane and other acaricides to the eggs of the mange mite** *Chorioptes bovis*. —*Canad. J. comp. Med.* **22,** 409-415. [Summary in French.] **2533**

Using a bioassay method, the authors tested 39 wettable powders or emulsions. None was 100% lethal to the eggs of *C. bovis* in one exposure, but the most effective compounds were lindane, dieldrin, trithion, thiodan and korlan. The residual toxicity of lindane on the cow was about nine days, which is an adequate period to be effective against most larvae emergent from eggs surviving treatment, and for all mites emergent from unaffected quiescent stages. Hence, a 10 day interval between treatments with lindane is appropriate. Limiting factors (toxicity, dermal irritation, food contamination) are discussed.—C. L'ECUYER.

KOUTZ, F. R. (1957). **Demodex folliculorum studies. VII. The evaluation of systemic drugs in the treatment of demodectic mange in dogs.**—*Speculum, Ohio* **11,** No. 1. pp. 39-42. **2534**

Five dogs with demodectic mange were treated with "Trolene" (Dow ET-57) by oral administration (1 or 1·5 g. twice weekly for 10 weeks) combined with bathing in a 2% emulsion of the compound twice weekly for 10 weeks. Treatment temporarily arrested the mange, but did not cure it. Diethylcarbamazine was given by mouth in large doses to 2 dogs: it did not cure the mange.—R.M.

SWEATMAN, G. K. (1958). **Biology of** *Otodectes cynotis*, **the ear canker mite of carnivores.**—*Canad. J. Zool.* **36,** 849-862. **2535**

The life history of *O. cynotis* was studied *in vitro* on epidermal debris from inside the ears of carnivores and all stages in the cycle described. Mites from the dog, cat, fox, and ferret were biologically and morphologically identical, and the varietal names *canis, cati,* and *furonis* are therefore invalid. The *in vitro* life cycle was completed on ear debris from several carnivora and susceptibility is referable to the individual rather than to the species.—C. L'ECUYER.

NIGGLI, H. B. & TEUSCHER, E. (1959). Raubmilben (Cheyletiella parasitivorax) als akzidentelle Hautparasiten bei der Katze. [*Cheyletiella parasitivorax* **as an accidental skin parasite in cats.**]—*Schweiz. Arch. Tierheilk.* **101,** 107-112. [Summaries in English, French and Italian.] **2536**

Infestation with *C. parasitivorax* is reported in cats for the first time. The symptoms were mild, and treatment with a derris preparation was successful. The owner of the 3 affected cats developed a skin rash, with itching, which disappeared after 3–4 weeks without treatment. Two cats with which he came into contact became infested also. No demodex mites were found, on which *C. parasitivorax* has been thought to feed.—M.G.G.

See also abstr. **2485** (vectors of rabbit fibromatosis); **2615** (warbles in deer); **2706** (report); **2711** (book).

PARASITES IN RELATION TO DISEASE [HELMINTHS]

GEBAUER, O. (1958). Kalk und seine Beziehungen zur Leberegelbekämpfung. Vorläufige Mitteilung. [**Use of lime for destruction of liver fluke miracidia.**]—*Arch. exp. VetMed.* **12,** 79-81. **2537**

Lime in water in proportions of 1:1,000 or 0·5:1,000 killed liver fluke miracidia immediately, one part of a 0·16% calcium hydroxide soln. in ten parts of water, within 20 sec., a 1:20 mixture within 90 min. and a 1:30 mixture within 19 hours. Miracidia appeared to be very sensitive to changes in the degree of hardness of the water. An aqueous soln. of lime is harmless to other forms of aquatic life and useful as a fertilizer.—E.G.

I. GRIGORYAN, G. A. (1956). [**Action of external environmental factors on the biology and resistance of miracidia and metacercariae of** *Fasciola gigantica*.] — *Trud. Armyan. nauchno-issled. Inst. Zhivotnovodstva i Veterinarii* **1,** Ser. Vet. No. 9 pp. 93-99. [In Russian.] **2538**

II. SOGOYAN, I. S. (1956). [**Reparative pro-**

cesses in the liver of sheep after treatment for *Fasciola gigantica* infestation.]—*Ibid.* pp. 107-112. [In Russian.] **2539**

III. SOGOYAN, I. S. (1956). [**Comparison of pathological changes caused in sheep by *Fasciola hepatica* and *F. gigantica*.**]—*Ibid.* pp. 113-117. [In Russian.] **2540**

I. Ova of *F. gigantica* did not survive freezing and were killed within 10 days in faeces dried at 2° to 4°C.; in moist faeces they remained alive for over two months. Miracidia required 35–37 days to develop in ova at 18° to 21°, while development in the snail *Radix auricularia* took over 2 months. Metacercariae were fairly resistant to the Armenian climate and were killed only by direct sunlight at mid-summer temp. Outbreaks of acute fluke disease in February or March may be explained by over-wintering of metacercariae. Ova in dung heaps were killed in 5 days by a temp. of 48° to 50°C.

II. 25 experimentally infected sheep were treated with either CCl_4 or hexachloroethane at 38–42 or 68–72 days after infection, except for 5 untreated controls. Sheep which did not die from infestation were killed after 124–136 days. Lesions were more severe in sheep treated 38–42 days after infection than in those treated at the latter period. Reasons for this apparently anomalous result were discussed.

III. Lesions in liver, spleen, lungs and heart were compared in 18 sheep experimentally infected with *F. hepatica* and 20 infected with *F. gigantica*, killed between 2 and 130 days after infection. In general, the giant fluke caused more damage than the common liver fluke.

—R.M.

YAMASHITA, J., OHBAYASHI, M. & KITAMURA, Y. (1958). **Studies on echinococcosis. IX. Differences in development of the tapeworm stage between *Echinococcus granulosus* (Batsch, 1786) and *E. multilocularis* Leuckart, 1863.**—*Jap. J. vet. Res.* **6**, 226-229. [In English. Authors' conclusions modified.] **2541**

There are morphological and developmental differences between *E. granulosus* and *E. multilocularis* in the strobila, rostellum, rostellar hook, sucker and genital organ. This agrees with the observations of H. Vogel (1957).

GIBBS, H. C. (1958). **On the gross and microscopic lesions produced by the adults and larvae of *Dochmoides stenocephala* (Railliet, 1884) in the dog.**—*Canad. J. comp. Med.* **22**, 382-385. [Summary in French.] **2542**

The gross and microscopic lesions caused by larvae and adults of *Dochmoides* (*Uncinaria*) *stenocephala* in the skin, lungs, stomach, and intestines of the dog are described. The effects were very similar to those described for other hookworms. A marked tissue response to the invasion of larvae in the skin and lungs was reported and its possible effect on the establishment of infection discussed.—C. L'ECUYER.

HERLICH, H., PORTER, D. A. & KNIGHT, R. A. (1958). **A study of Haemonchus in cattle and sheep.**—*Amer. J. vet. Res.* **19**, 866-872. **2543**

Numerous specimens of *Haemonchus* from sheep and cattle infected from both an ovine and a bovine source were examined and the findings confirm those of Roberts *et al.* [*V.B.* **25**, 1081] that the bovine and ovine strains of *Haemonchus* are distinct.

The dimensions of the spicules of males of the two strains are significantly different though the final host from which the worms were obtained had no influence on this character. The majority of females of the bovine strain had a short knob-like vulval process, while most of those of the ovine strain had a long linguiform process.

Infections of the ovine strain were more successful in lambs than in calves and the worms grew to a greater size. Similarly worms of the bovine strain were more numerous and larger in cattle than in sheep.

The prepatent period of the two strains was significantly different.

Haematological studies showed that infections of the ovine strain gave rise to a reduction in packed red cell volume in both sheep and cattle while the bovine strain had this effect on cattle only.—J. F. MICHEL.

SOULSBY, E. J. L., SOMMERVILLE, R. I. & STEWART, D. F. (1959). **Antigenic stimulus of exsheathing fluid in self-cure of sheep infested with *Haemonchus contortus*.** — *Nature, Lond.* **183**, 553-554. **2544**

The serological reaction which occurs in "self-cure", in sheep infested with *H. contortus*, was examined by the agar-diffusion technique. The antigenic components responsible for the main reactions were then identified by the cross-reactions which occurred between the serum, heated antigen, exsheathing fluid solution from *H. contortus* infective larvae, and metabolic products.

At the time of the self-cure reaction much of the existing adult *H. contortus* infestation was located in the small intestine in a state of disintegration, while third and fourth stage larvae were present in the abomasum.

From these observations it is suggested that the self-cure reaction is initiated by an antigenic

stimulus arising from the third ecdysis, the antigens being similar to those present in the exsheathing fluid which is secreted at the time of the second ecdysis.—J. H. Rose.

Silverman, P. H. (1959). *In vitro* **cultivation of the histotrophic stages of** *Haemonchus contortus* **and** *Ostertagia* **spp.**—*Nature, Lond.* **183,** 197. **2545**

The histotrophic stages of *H. contortus* and *Ostertagia* spp. were cultured in roller tubes containing chick embryo extract, autoclaved sheep liver extract, casein hydrolysate and sheep serum, in a 2:2:2:1 ratio. Worms reached the adult stage in 24–30 days but were stunted. —J. H. Rose.

Scarnell, J. & Rawes, D. A. (1959). **Bephenium embonate in the prevention of nematodirus infestation in lambs.** — *Vet. Rec.* **71,** 163-167 & 168. [Authors' summary modified.] **2546**

An effective dosing routine with bephenium embonate for preventing nematodirus infestation in lambs was tested. Details are given of the methods and results. The relationship between the likely periods of exposure to infective larvae and the dosing routine is discussed.

Rosenberger, G. & Heeschen, W. (1959). Beitrag zur Behandlung des Lungenwurmbefalls der Rinder mit Cyanacethydracid. **[Cyanacethydrazide for the treatment of lungworms in cattle.]** — *Dtsch. tierärztl. Wschr.* **66,** 169-173. [Summary in English.] **2547**

Cyanacethydrazide was administered to 408 cattle of different ages and sex on 26 farms. On 3 successive days 208 cattle received orally 20 mg./kg. body wt. and 200 received s/c or i/m 17·5 mg./kg. No harmful side effects were seen. 78% of healthy carriers of lungworms and 46% of those with mild clin. symptoms ceased excreting lungworm larvae, but results were disappointing in severely affected animals. —M.G.G.

Breza, M. (1959). K epizootológii metastrongylóz prasiat. **[Lungworms in pigs.]** — *Vet. Čas.* **8,** 94-99. [In Slovak. Summaries in English, French, German and Russian.] **2548**

Attention was drawn to the presence under floor boards of pigsties of large numbers of the earthworm *Eisenia foetida,* a potential intermediate host of the lungworm of pigs.—E.G.

Guilhon, J. & Petit, J.-P. (1958). Recherches sur les propriétés anthelminthiques de l'hydrazide de l'acide cyanacétique. **[Anthelmintic properties of cyanacethydrazide.]**—*Bull. Acad. vét. Fr.* **31,** 355-357. **2549**

The authors studied the effect of cyanacethydrazide on the lungworms of sheep. *In vitro* the drug had no adverse effect on the first stage larvae of *Muellerius minutissimus.* In two small experiments with infected sheep (though the species present are not specified) the drug given on three consecutive days at a dosage of 17·5 mg./kg. or at 30 mg./kg. did not affect the output of larvae.—J. F. Michel.

Ilijaš, B. (1958). Askaridoza svinje u rentgenskoj slici. **[Radiographic demonstration of ascaris in the small intestine of pigs.]** — *Vet. Arhiv.* **28,** 327-332. [In Croat. Summaries in English and French.] **2550**

Radiography of the pig's abdomen enabled an estimate to be made of the degree of ascaris infestation. The method was useful when testing anthelmintics.—R.M.

Velichkin, P. A. (1958). **[Attempt to eradicate strongyles and parascarids from horses in breeding studs.]**—*Veterinariya, Moscow* **35,** No. 8 pp. 47-49. [In Russian.] **2551**

The author reviewed the progress of an eradication campaign which commenced in the Caucasus in 1945 and which was extended in 1957 to cover all studs in the R.S.F.S.R. The campaign is based on 2–3 years' anthelmintic treatment of all horses with carbon tetrachloride or phenothiazine given at regular intervals, planned changes of pasture, improved water supply and feeding, improved stable hygiene, and biothermal treatment of dung. It commenced in all studs in North Caucasus in 1951 and illness and losses from helminths ceased in 1956. Over 5,000 horses were treated during this period; there was a tenfold reduction in cases of colic and diseases of the digestive system were reduced by a third. An unexpected result was the disappearance of paratyphoid from foals. The campaign was applied to Moscow studs in 1952 and since 1955 there had been no losses from helminth infestation. Between 1950 and 1953 it was extended to 6,000 horses in the Rostov oblast. Here strongyles were eradicated by the end of the second year and the incidence of *Trichonema* was much reduced. The correct time for large-scale prophylactic phenothiazine treatment was during the pasturing period. Good results were obtained in a group of 60 yearlings which were given phenothiazine mixed with grain throughout the 3 summer months at doses of 2 g. a horse daily.—R.M.

HABERMANN, R. T. & WILLIAMS, F. P., JR. (1958). **The identification and control of helminths in laboratory animals.**—*J. nat. Cancer Inst.* **20,** 979-1009. **2552**

The authors discussed diagnosis and control of infestation in rats and mice with *Hymenolepis nana, H. diminuta, Heterakis spumosa, Syphacia obvelata, Aspicularis tetraptera, Trichosomoides crassicauda, Nippostrongylus muris* and *Capillaria hepatica.* They discussed helminth parasites in g.pigs with special reference to *Paraspidodera uncinata,* infestation in rabbits with *Passalurus ambiguus,* in rhesus monkeys with *Oesophagostomum apiostomum, Strongyloides intestinalis* and *Capillaria hepatica.* Among parasites of dogs and cats they listed *Dipylidium caninum, Taenia pisiformis, T. taeniaeformis, Ancylostoma caninum, Trichuris vulpis, Capillaria felis-cati, C. aerophila, C. plica, Dirofilaria immitis* and *Aelurostrongylus abstrusus.*—E.G.

SCHULZ, R. (1958). L'immunité contre les helminthoses. Ses bases théoriques et son importance pratique. **[Immunity in helminth infections of livestock.]**—*Bull. Off. int. Epiz.* **49 bis,** Nos. 11-12 pp. 265-280. [In English pp. 281-296.] **2553**

This is a general article, with particular reference to the practical application of immunological studies in the control of helminth diseases.—J. H. ROSE.

See also absts. **2359** (transmission of salmonella by nematode larvae); **2611** (strongylosis of nutria); **2615** (infestations of deer); **2617** (Onchocerca cervicalis and periodic ophthalmia); **2706** (report).

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

HÜBNER, L. (1959). Neoplasmen der Iris beim Hunde. **[Neoplasms of the iris in dogs.]** — *Wien. tierärztl. Mschr.* **46,** 121-126. [Summaries in English, French and Italian.] **2554**

H. discussed the literature on neoplasms of the eye in domestic animals, particularly in dogs. Of about 5,000 small animals with various tumours, seen at the Vienna Veterinary College, only seven dogs and three cats had malignant neoplasms of the uvea. Details were given of sarcoma of the iris in a nine-year-old male and a five-year-old female fox terrier, and an eight-year-old male Alsatian, seen during 1958. Differential diagnosis was discussed.—E.G.

LOMBARD, L. S. & MOLONEY, J. B. (1959). **Experimental transmission of mast cell sarcoma in dogs.**—*Fed. Proc.* **18,** 490. [Authors' abst. modified.] **2555**

A spontaneous mast cell sarcoma of the dog has been transferred using a subcutaneously implanted tumour suspension, through 7 generations of puppies, 1–30 days old. A filtrate was prepared from the second generation transplant and by means of serial passage the tumour has been carried through 3 generations of puppies. The gross and histological characteristics of the tumours were similar when either the filtrate or the mince was used. The intranuclear crystalloids and acidophilic intracytoplasmic bodies described in other spontaneous mast cell tumours were observed in the serial passages of the filtrate as well as of the mince. Heterotransplants in rats, mice, g.pigs, hamsters and cats were unsuccessful. The tumour mince retained its ability to produce tumours after storage at −70°C. for at least a year.

RASORI, L. (1959). Sulle displasie e neoplasie della mammella di gatta. **[Dysplasia and neoplasia of the mammary gland in the cat.]** —*Nuova Vet.* **35,** 10-19. **2556**

Case accounts are given of the following conditions of the mammary gland in cats: fibrocyst (1), cystic fibroadenoma (1), carcinoma (2), fibrocysts associated with carcinoma (4). Clinical and histological aspects, prognosis and treatment are discussed.—T.E.G.R.

PAPPARELLA, V. (1958). Ricerche sulla leucemia linfatica dei bovini. Il fenomeno dell'interferenza quale rivelatore della sua eziologia virale. **[The interference phenomenon in bovine leucosis.]**—*Zooprofilassi* **13,** 839-847. [Summaries in English, French and German.] **2557**

Amnio-allantoic liquid of chick embryos inoculated with suspension of lymph node from a calf with leucosis was injected, after 27 passages, into the allantoic cavity of 9-day chick embryos. Amnio-allantoic liquid of normal embryos was injected into control embryos. After incubation at 38° to 39°C. for 72 hours all the chick embryos were injected with influenza virus and incubated at 36°C. for 20 hours. Interference was deduced since the haemagglutination titre in control chick embryos was much higher than in embryos which had been inoculated with the bovine leucosis agent.—T.E.G.R.

FRIEND, C. (1959). **Immunological relationships of a filterable agent causing a leukemia in adult mice. I. The neutralization of infectivity by specific antiserum.** — *J. exp. Med.* **109,** 217-228. [Author's summary modified.] **2558**

The antigenic character of a filtrable agent previously described [*V.B.* **27,** 2752] was investigated. Mice and rabbits injected with filtrate yielded sera which specifically neutralized infectivity of the agent. Normal sera, sera from mice with other neoplasms—including leucaemias from which no causative agent has as yet been obtained—and sera from leucaemic human beings contained no such neutralizing antibody. A formolized vaccine prepared from filtrates of leucaemic spleens induced a significant degree of immunity against the agent, about 80% of the vaccinated mice being immune on challenge.

HILL, C. H. & GARREN, H. W. (1959). **Effect of calcium and phosphorus on susceptibility of chicks to the lymphoid tumor, RPL 12.**— *Fed. Proc.* **18,** 530. **2559**

Experiments with simplified maize–soya bean meal and practical diets showed that the simplified diet greatly increased susceptibility to this tumour. The calcium and phosphorus levels of the simplified diet were higher than those of the practical diet.—R.M.

See also absts. **2485** (rabbit fibromatosis); **2486** (polyoma virus in rodents); **2578** (cholesteatoma); **2615** (myxomatosis).

NUTRITIONAL AND METABOLIC DISORDERS

HEATH, G. B. S. (1959). **Nutritional hazards caused by radioactive contamination of foods.** —*Proc. Nutr. Soc.* **18,** 49-53. **2560**

The carcasses of animals that have to be slaughtered after eating crops contaminated by radioactive isotopes may be used for human consumption. Bones and viscera would have to be discarded, but muscle should be safe, unless ^{137}Cs is present in dangerous quantities. Milk from cows eating contaminated food must be monitored. Butter and cheese can be made from heavily contaminated milk and stored until the radioactivity has declined sufficiently.—M.G.G.

AP GRIFFITH, G. (1958). **Nitrate content of some grass species and strains.** — *Nature, Lond.* **182,** 1099-1100. **2561**

The nitrate nitrogen of a sample bulked from several hundred herbage samples, mainly grass, was approx. 0·1%. An investigation of 8 species and strains of grasses grown as spaced single plants and in swards heavily manured with nitrogen showed perennial rye-grass (0·365%) and cocksfoot (0·343%) in spaced planting to be considerably higher in nitrate than the remaining grasses: in swards a strain of rye-grass had the highest content (up to 0·243%) while the cocksfoot, surprisingly, had the lowest.—E.V.L.

LE BARS, H., MOLLÉ, J., RERAT, A. & SIMONNET, H. (1958). La perfusion des organes digestifs. Méthode d'étude de l'absorption. **[Perfusion of digestive organs as a method of studying absorption in ruminants.]** — *Bull. Acad. vét. Fr.* **31,** 305-310. **2562**

A technique is described for cannulating the arteries and veins of rumen, reticulum, small intestine or caecum of anaesthetized sheep, suitable for short-term perfusion studies. The method has been used to study metabolism of B vitamins [*V.B.* **28,** 2601].—R.M.

MAHAFFEY, L. W. (1959). **Ganglionic lesions in grass sickness of horses.** — *Vet. Rec.* **71,** 170-171. [Author's summary modified.] **2563**

Histological examination of the ganglia of the autonomic nervous system of 4 horses with grass sickness revealed extensive degenerative changes in the neurones. These were similar to those described by Obel [see *V.B.* **26,** 516]. They appear to be the essential lesions of the disease and to offer an explanation of the symptoms, course, and resistance to therapy.

I. OXFORD, A. E. (1958). **Bloat in cattle. IX. Some observations on the culture of the cattle rumen ciliate *Epidinium ecaudatum* Crawley occurring in quantity in cows fed on red clover (*Trifolium pratense* L.).** — *N. Z. J. agric. Res.* **1,** 809-824. **2564**

II. BAILEY, R. W. (1958). **Bloat in cattle. X. The carbohydrases of the cattle rumen ciliate *Epidinium ecaudatum* Crawley isolated from cows fed on red clover (*Trifolium pratense* L.).** — *Ibid.* 825-833. [Authors' summaries modified.] **2565**

I. In spring and autumn, but not so markedly in high summer, the ciliate *E. ecaudatum* was the predominant oligotrich in the rumen in two cows fed exclusively on red clover. A method was devised whereby massive suspensions of this ciliate, in the actively motile state and virtually free from holotrich ciliates and bacteria, can be separated from rumen contents

in vitro in a day. Using a preparation of red-clover starch grains containing a little green plant material, a culture was kept alive in a high concentration of penicillin for 8 days, during which cell division took place. A high partial pressure of carbon dioxide gas is essential for continued life and activity of *Epidinium*.

II. Cell-free extracts were prepared from virtually pure cultures of *E. ecaudatum*. Water extracts contain an amylase while phosphate buffer extracts contain the same amylase together with a less soluble maltase and occasionally a cellobiase. Invertase and β-glucosidase were absent from the extracts which were also unable to hydrolyse lactose, melibiose, αα-trehalose and cellulose.

I. CHERKASOV, D. P. (1958). **[Sulphates and phenols in the blood of high-yielding cows with a disorder of metabolism (alimentary toxaemia).]** — *Trud. Mosk. vet. Akad.* **22**, No. 2. pp. 112-119. [In Russian.] **2566**

II. MOLCHANOV, S. G. (1958). **[Treatment of high-yielding cows with metabolic disorders.]** —*Ibid.* pp. 120-139. [In Russian.] **2567**

I. In metabolic disorders of the type described by Bol' & Vertinskii [*V.B.* **27**, 2756] there was ketonaemia (10–20 mg.% of ketone bodies) and decrease in blood sugar (40–55 mg.%). There were also increased amounts of sulphates (average 2–5 mg.%) and phenols (0·6–1 mg.%) in the blood. When the sugar content of the blood increased to 65–70 mg.% while the ketonaemia remained the same, the conc. of sulphates fell to normal values (0·5–1·5 mg.%).

II. The type of metabolic disorder described above could be treated and prevented (without loss of milk yield) by reducing the amount of concentrates from 450–500 g. to 160–200 g./litre of milk yield and by providing abundant succulent fodder.—R.M.

I. ARKHIPOV, N. I. (1957/58). **[Bone lesions in high-yielding cows with disorders of protein and mineral metabolism. I & II.]** — *Trud. Mosk. vet. Akad.* **19**, No. 2. pp. 6-15; **22**, No. 1. pp. 73-80. [In Russian.] **2568**

II. SHISHKOV, V. P. (1957). **[Lesions of the cardiovascular system in high-yielding cows with metabolic disorders.]**—*Ibid.* **19**, No. 2. pp. 34-47. [In Russian.] **2569**

I. High-yielding cows aged 5 years or more slaughtered on account of the metabolic disorder described by Bol' & Vertinskii [*V.B.* **27**, 2756], showed various degrees of osteomalacia. In the cows aged 5–6 years with the acute and severe type of disorder, accompanied by considerable dystrophy of parenchymatous organs, the osteomalacia was in the initial stages and was clinically inapparent.

II. In 45 cows with the metabolic disorder previously described dystrophic lesions were found in the heart muscle and in nerve ganglia. The walls of coronary vessels showed fibrinoid swelling and atherosclerotic changes were found in the aorta. The nature and extent of these vascular lesions was related to lesions in the parenchymatous organs.—R.M.

I. IVANOV, I. V. (1957/58). **[Histological lesions of the sympathetic and spinal ganglia from apparently healthy dairy cows.]** — *Trud. Mosk. vet. Akad.* **19**, No. 2. pp. 26-33; **22**, No. 2. pp. 61-66. [In Russian.] **2570**

II. IVANOV, I. V. (1957). **[Histological lesions of the sympathetic and spinal ganglia in high-yielding cows with metabolic disorders.]** — *Ibid.* **19**, No. 2. pp. 16-25. [In Russian.] **2571**

I. The author examined sections of the anterior cervical, stellate, coeliac and spinal ganglia of 15 healthy slaughtered cows aged 4 and 14 years. The types of nuclei in each group of ganglia were briefly described.

In his second paper, the author discussed the interpretation of his findings and concluded that histological structure peculiar to certain ganglia and to a given species of animal should be taken into account when examining ganglia for pathological changes. The presence of lymphoid-histiocytic infiltrates in the stroma of sympathetic ganglia was by no means exceptional in apparently healthy cows.

II. Ganglia were examined from 40 high-yielding cows slaughtered on account of loss of milk due to "disturbance in metabolism" [see *V.B.* **27**, 2756]. Lesions in nerve ganglia were characterized by dystrophic, atrophic and necrotic processes in the nerve cells, and proliferation of the connective tissue stroma and glial elements. These lesions were regarded as the chief cause of dystrophic changes in parenchymatous organs and of functional disturbances of various body systems which characterize the metabolic disturbance.—R.M.

SOUTHCOTT, W. H. & HEWETSON, R. W. (1959). **Studies on non-contagious posthitis of sheep.** — *Aust. vet. J.* **35**, 65-74. [Abst. from authors' summary.] **2572**

On the Northern Tablelands of New South Wales the external but not the internal form of non-contagious posthitis is common in wethers grazing on non-leguminous native pastures. The incidence of both forms increased when the

wethers were given full-time access to improved pasture containing legumes.

External ulceration increased during autumn to spring and declined in summer. Internal ulceration first occurred in winter, usually after a prolonged period of external ulceration, increased to a high level in spring and decreased in summer.

Surgical treatment by a ventral incision which was best extended to the posterior limit of the prepuce, was an effective treatment for internal ulceration.

Fasting cured the less severe cases of both conditions but had some adverse effects on the sheep. Sheep cured by fasting and returned to a clover pasture soon relapsed.

Procaine penicillin intramuscularly or topically and copper sulphate by topical application produced temporary cures of some cases of internal ulceration. Intramuscular procaine also temporarily cured external ulceration.

DONALD, C. M. & ALLDEN, W. G. (1959). **The summer nutrition of weaner sheep: the deficiencies of the mature herbage of sown pasture as a feed for young sheep.**—*Aust. J. agric. Res.* **10**, 199-218. [Authors' summary modified.] **2573**

Of two field studies conducted in the Mediterranean type environment of Adelaide, the first was designed to assess the effects of defective summer grazing by young sheep upon productivity, while the second sought to define the nature of the nutritional deficiencies of the mature herbage of sown pastures in terms of energy and protein respectively.

The results show that the mature herbage of the sown pastures was deficient in both protein and energy. However, the retarded growth resulting appeared to be of no permanent significance in average to well grown wether weaners; summer periods of defective nutrition did not affect ultimate size nor influence subsequent productivity.

KUNKEL, H. O. & ROBBINS, J. D. (1959). **Dietary tetracycline antibiotics and serum mineral levels of sheep fed a reported calculogenic diet.**—*Fed. Proc.* **18**, 532. **2574**

Fifty wether lambs were fed a diet consisting of oats, oat straw, wheat, linseed meal, molasses, and supplemented with vitamin A and 2·4% K_2HPO_4. Chlortetracycline was fed to ten lambs at 10 mg. and to ten at 20 mg. per lb. of food, and oxytetracycline was fed to ten at 10 mg./lb. Chlortetracycline lowered the Mg content of the serum and raised the Ca content. Oxytetracycline had no such effect. Serum concentrations of P, K, and Na were not affected by antibiotics. The incidence of urinary calculi was not related to the mineral constituents of the serum nor to the administration of antibiotic.
—M.G.G.

PRESTON, T. R., MCLEOD, N. A. & DINDA, P. K. (1959). **The effect of chlortetracycline on growth of early-weaned calves.** — *Anim. Prod.* **1**, No. 1 pp. 13-19. [Abst. from authors' summary.] **2575**

From the results of the authors' experiment and from evidence in the literature it is postulated that one of the effects of feeding antibiotics to calves is to reduce the fermentative activity of rumen bacteria and consequently the amount of gas produced in the rumen, the net result being that the animal eats more food and hence grows more quickly.

LEV, M. & FORBES, M. (1959). **Growth response to dietary penicillin of germ-free chicks and of chicks with a defined intestinal flora.** — *Brit. J. Nutr.* **13**, 78-84. [Authors' summary modified.] **2576**

The response of germ-free chicks to dietary penicillin was compared with that of chicks whose gut had been intentionally populated with bacteria.

Strains of some predominant bacterial species from the intestinal flora of chicks (*Escherichia coli, Lactobacillus lactis* and *Streptococcus liquefaciens*) had no effect on growth when implanted together in germ-free chicks.

Clostridium welchii Type A, implanted alone or with the other three species depressed the growth rate as compared with that of germ-free chicks.

Procaine G added to the diet (45 mg./kg.) had no effect on the growth of germ-free chicks or of chicks with a bacterial flora that itself did not affect growth, but did counteract the growth depression due to the presence in chicks of *Cl. welchii* alone or together with a limited defined intestinal flora.

Penicillin either eliminated the clostridia from the intestine or reduced their toxigenicity. *Cl. welchii* may therefore be a factor in the growth-depressing 'infection' that is counteracted by penicillin supplements in the diet.

WALKER-LOVE, J., LAIRD, R., JR., THOMSON, J. M. & GRAY, K. W. (1959). **Ultra-violet irradiation of fattening pigs.** — *Anim. Prod.* **1**, No. 1 pp. 21-29. [Authors' summary modified.] **2577**

Ninety-six pigs, 8–10 weeks old at the beginning of the trial, were used to study the

effects of ultra-violet irradiation (22½ hours daily) with and without oxytetracycline supplements of the diet. All meal fed was fortified with vitamin D.

In this trial ultra-violet irradiation was without effect. Oxytetracycline supplementation resulted in significantly higher live-weight increases, lower age at slaughter and improved feed conversion. No significant treatment differences were recorded for any of the carcass measurements.

Ultra-violet irradiation did not reduce the incidence of 'thumping' (dyspnoea) in pigs nor the degree of lung damage by virus pneumonia, whereas dyspnoea was significantly less on the oxytetracycline treatments.

The results are discussed in relation to vitamin D requirements and the pressure of virus pneumonia.

ŻURKOWSKA-PIETRASZEK, T. (1959). *Cholesteatomatosis* płuc u norki. [**Cholesteatoma of the lungs in mink.**]—*Med. Wet., Warszawa* **15,** 43-44. [In Polish.] **2578**

P.M. examination of a mink which died after gradual loss of condition revealed numerous yellow, shining, millet size lesions in the lungs, clay colour liver and enteritis. No acid-fast organisms were found and unstained smears from the lung lesions revealed numerous cholesterol shaped crystals. In sections stained with scharlach R the centre of the lesions was unstained and the periphery yellow-red, which the author considers characteristic for cholesterol or its esters. In sections stained by the Schultz method the lesions were bluish-green. The author considers that the cause may have been an increased supply of cholesterol either in food (kidneys, brain, eggs) or by disturbance of fat metabolism (as, *e.g.* in Gaucher's disease in man) and that enteritis and not cholesteatoma was the cause of the animal's death.

—M. GITTER.

CUNNINGHAM, I. J. & HOGAN, K. G. (1958). **The influence of diet on the copper and molybdenum contents of hair, hoof and wool.** —*N. Z. J. agric. Res.* **1,** 841-846. [Authors' summary modified.] **2579**

The average Cu content of the hair of normal cattle was 9 p.p.m. Variations in dietary Cu alone did not affect this, but increased ingestion of Mo caused a reduction. The Mo content of ox hair, ox hoof, and sheep's wool was increased by drenching with ammonium molybdate, but the increase was small or did not occur if sodium sulphate was also given. [See also *V.B.* **28,** 3331.]

MILLER, E. C. & DENTON, C. A. (1959). **Feather depigmentation resulting from feeding molybdenum plus thiosulfate.**—*Proc. Soc. exp. Biol., N.Y.* **100,** 179-183. [Authors' summary modified.] **2580**

Supplementation of the diet of chicks with vitamins or lysine did not prevent feather depigmentation when the diet contained molybdenum and thiosulphate. No feather depigmentation occurred if copper (50 p.p.m.) was added. Chicks with depigmentation had more copper, molybdenum and sulphur^{35} in the liver than controls or those receiving either thiosulphate or molybdenum. In all chicks fed radioactive sodium thiosulphate, radioactivity was found in the taurine fraction but not in the methionine or cystine fraction of liver hydrolysates.

REINACH, N. & LOUW, J. G. (1958). **The utilization of the phosphorus from an aluminium-iron rock phosphate. I. By the rat. II. By sheep.**—*Onderstepoort J. vet. Res.* **27,** 611-615 & 617-623. **2581**

I. The availability of the phosphorus in two samples of an aluminium-iron rock phosphate was determined in the rat. In evaluating these products live weight gains, the ash content of the femurs and total phosphorus retention were used as criteria. Eight albino rats were used in each group and the experiment lasted six weeks. The control group doubled their weights while the other two groups showed an increase of only 78%. The control group developed larger bones and showed a percentage ash of the femur of 49·7 as against 35·0 and 34·4. Figures for the percentage retention of phosphorus were 53·3 as against 15·0 and 14·1 for the two rock phosphate groups. The rock phosphates were, therefore, found to be a poor source of phosphorus and cannot be recommended as a substitute for bone meal or other phosphatic products in the ration of animals.

II. The availability of the phosphorus in "bone pellets" and two samples of an aluminium-iron rock phosphate was compared with bone meal, using sheep as experimental animals.

In evaluating these products, inorganic phosphorus content of the blood, live weight gains, phosphorus retention, X-ray photographs and the pathological and chemical examination of the bones were used as criteria.

The inorganic phosphorus of the blood of the sheep receiving the bone meal and "bone pellets" fluctuated between 5 and 7 mg.% with an average of 6·2%, whereas the values for the two groups receiving the rock phosphates gradually dropped from 6·3 to 2·0% within 21 weeks.

The live weight gains showed a 50% better growth for the sheep receiving the bone meal and "bone pellets" than those on the rock phosphates. The animals on the rock phosphate supplementation showed a negative phosphorus balance during the first metabolism period, changing to slightly positive balances (7·9 and 1·9) four months later. The other two groups (bone meal and bone "pellets") retained on an average 21·0% of the ingested phosphorus for the two respective periods.

The bones of the sheep receiving the bone meal and bone pellets showed normal calcification, while distinct changes were noticed with signs of osteomalacia and atrophy of the spongiosa in the bones of the sheep receiving the rock phosphates.

From the overall results it is concluded that "bone pellets" are as efficient as bone meal as a source of phosphorus, whereas aluminium-rock phosphate is practically useless in that respect and cannot replace bone meal in animal nutrition.

WORDEN, A. N. & REID, T. F. (1959). **Calcium lactate as a dietary supplement for laying hens.**—*Vet. Rec.* **71**, 179-180. **2582**

In 3 groups, each of 12 pullets, the control group (first group) was fed a basal mash, and in the other two calcium lactate pentahydrate (containing 70% calcium lactate) was added at the rate of 1% (second group) and 2% (third group) by substitution for an equivalent weight of calcium carbonate. The respective calcium content of the 3 rations was therefore 1·83%, 1·5% and 1·32%. In 8 months the egg production of the three groups was, respectively, 1,443, 1,736, and 1,696. Food consumption was 738, 528, and 605 kg.—M.G.G.

BERTRAND, M., FERNEY, J. & DUBS, N. (1958). Calcémie et calciurie chez les bovins. **[Calcium in blood and urine of cows.]**—*C.R. Soc. Biol., Paris* **152**, 78-81. **2583**

Blood samples were taken from 2 cows every second or third day for 30–40 days. The calcium content of blood from each cow continually fluctuated within physiological limits. The calcium content of urine was subject to large fluctuations between 15 and 150 mg./litre.

—R.M.

SMITH, R. H. (1959). **Calcium and magnesium metabolism in calves. III. Endogenous faecal excretion and absorption of magnesium.**—*Biochem. J.* **71**, 306-311. [Author's summary modified.] **2584**

Endogenous faecal excretion of Mg in calves was estimated to be about 0·5 mg./kg. body wt. daily at 2–5 weeks of age and to increase to about 2·2 mg./kg. body wt. daily at 26–32 weeks. This increase does not account for the decrease in the utilization of Mg with age in calves fed on milk. Both phenomena are probably secondary to a decrease in absorption efficiency. S/c inj. of magnesium sulphate had no apparent effect on endogenous faecal excretion. Calves fed on milk at the age of 21–34 weeks were estimated to absorb about 40% of the Mg in the milk, irrespective of the amount of Mg available, at least up to an intake of about 3 g. daily.

MEYER, H. & SCHMIDT, P. (1958). Der Einfluss von Thyroxin auf den Magnesium- und Kalziumstoffwechsel beim Kalb. **[Influence of thyroxine on magnesium and calcium metabolism in calves.]** — *Dtsch. tierärztl. Wschr.* **65**, 602-604. [Summary in English.] **2585**

Daily inoculation of 4 calves with thyroxine for 8–14 days increased the urinary and faecal excretion of Mg and Ca and caused a transitory fall in the concentration of Mg in the blood. It is considered that grass tetany is caused by a combination of several factors, of which the most important are insufficient dietary Mg, heightened activity of the thyroid gland through stress, and incapacity to mobilize sufficient Mg from the bones.—M.G.G.

TODD, J. R. (1959). **The determination of calcium and magnesium in blood serum by direct titration.**—*Brit. vet. J.* **115**, 86-89. [Author's summary modified.] **2586**

Methods of estimating Ca and Mg in blood serum are reviewed from the veterinary point of view. The method proposed by Friedman & Robin (1955) is quick and simple and a modification suitable for routine use with livestock sera is described.

SMYTH, P. J., CONWAY, A. & WALSH, M. J. (1958). **The influence of different fertiliser treatments on the hypomagnesaemia proneness of a rye grass sward.**—*Vet. Rec.* **70**, 846-849. **2587**

Eighteen cows were transferred abruptly from a winter regimen to plots of young spring grass. The Mg content of the serum fell to 1·5 mg.% in the cows on plots which had been fertilized with nitrogen only or potassium only, but the fall was no greater than in the cows on the control, untreated plot, and there were no symptoms of grass tetany. But there was a sharp fall to 0·7 mg.% in the cows on the plot ferti-

lized with both N and K, and 2 of the cows had clinical tetany. Analysis of herbage samples, however, showed no appreciable differences in the content of Mg, K or crude protein that could be correlated with the development of hypomagneseamia. It is concluded that fertilization with K plus N gave rise to some unidentified factor causing hypomagnesaemia.—M.G.G.

HESS, R., MACINTYRE, I., ALCOCK, N. & PEARSE, A. G. E. (1959). **Histochemical changes in rat kidney in magnesium deprivation.**—*Brit. J. exp. Path.* **40,** 80-86. [Survey of paper, p. ii, modified.] **2588**

In rats fed a diet deficient in Mg, as the Mg content of the plasma fell, the proximal tubules of the kidneys showed mitochondrial swelling and subsequent decline in enzyme activity. In the terminal stage intracellular calcification and necrosis were observed.

SMITH, W. H., PLUMLEE, M. P. & BEESON, W. M. (1958). **Zinc requirement for growing swine.** — *Science* **128,** 1280-1281. [Authors' abst. modified.] **2589**

Pigs fed rations containing 16, 21, 26, 31, 36, 41, or 46 p.p.m. of zinc gained 0·06, 0·13, 0·25, 0·52, 0·61, 0·69, and 0·76 lb., respectively, per day. Food required per unit of gain decreased with each increment of zinc. Parakeratosis occurred in pigs fed 36 p.p.m. of zinc or less.

GRANT, C. A. & THAFVELIN, B. (1958). Selen och hepatosis diaetetica hos svin. Et förhandsmeddelande om den profylaktiska effekten av selen under försöksbetingelser. **[Prophylactic action of selenium in toxic liver dystrophy of pigs.]**—*Nord. VetMed.* **10,** 657-663. [In Swedish. Summaries in English and German.] **2590**

Newly-weaned piglets from one litter were divided into two groups of 5. Both groups received a diet known to cause hepatic necrosis and one group received in addition sodium selenite at the rate of 0·2 mg./kg. feed. The pigs which were not given selenium died within 22–45 days from toxic liver dystrophy, but none of the pigs given selenium died and the liver was normal in every case. The use of selenium compounds as feed supplements for pigs was not, however, recommended until the results of prolonged feeding were known.—R.M.

ATERMAN, K. (1959). **Selenium, liver necrosis and depigmentation of incisors in the rat.**—*Brit. J. Nutr.* **13,** 38-41. [Author's summary modified.] **2591**

Fifteen pairs of litter-mate male albino rats were fed from weaning on a diet with baker's yeast as the sole source of protein, supplemented, for one animal of each pair, with 20 p.p.m. sodium selenite.

Whereas all the unsupplemented rats developed fatal liver necrosis, the supplement of sodium selenite not only prevented the onset of liver necrosis in their litter-mate controls, but prolonged their survival time.

However, selenium had no apparent effect on the depigmentation of the incisors which takes place if rats are fed on a diet deficient in tocopherol, and which is prevented only by this vitamin.

SAUER, F., LAUGHLAND, D. H. & DAVIDSON, W. M. (1959). **Silica metabolism in guinea pigs.**—*Canad. J. Biochem. Physiol.* **37,** 183-191. **2592**

In view of the economic losses resulting from silica urolithiasis in Western range steers, the excretion of silica (SiO_2) in urine and faeces was determined by colorimetric analysis, after oral and intraperitoneal administration to g.pigs. After oral administration, the urinary excretion of silica generally reached a maximum value that was not exceeded by increasing the dose, probably because of the limited solubility of ingested silica in the contents of the gastrointestinal tract. Urinary excretion after intraperitoneal administration was considerably greater than after oral administration. The results suggest that silica is depolymerized to the soluble form before it is excreted in the urine.—C. L'ECUYER.

DEHORITY, B. A., EATON, H. D., HAZZARD, D. G., GRIFO, A. P., JR. & ROUSSEAU, J. E., JR. (1959). **Biochemical and physiological changes in bovine hypovitaminosis A.** —*Fed. Proc.* **18,** 522. **2593**

Four pairs of calves, one of each pair deficient in vitamin A and the other adequate, were used in studies on blood serum, cerebrospinal fluid and aqueous humour composition, as well as for measurement of c.s.f. and intraocular pressure. Osmotic pressure of these three fluids, in addition to sodium, potassium, phosphorus and calcium concentration of c.s.f. appeared to be relatively unaffected by the vitamin A status of the animal.—R.M.

MILLEN, J. W. & WOOLLAM, D. H. M. (1958). **Effect of vitamin B complex on the teratogenic activity of hypervitaminosis A.** — *Nature, Lond.* **182,** 940. **2594**

Commonest malformations of the young induced by maternal hypervitaminosis A are cleft palate and deformities of the brain: mat-

ernal deficiencies of the B complex produce similar foetal anomalies. In the authors' experiments on rats, the teratogenic activity of hypervitaminosis A was greatly modified by the concurrent injection of vitamin B complex (containing thiamine, nicotinamide, riboflavin and pyridoxine). These results support the hypothesis that there is a relative balance between the amounts of different vitamins critical for normal development and also tend to indicate that an excess of vitamin A may produce a deficiency of vitamin B which may be compensated by concurrently administering it.—E.V.L.

WILKINSON, F. C. (1959). **Nutrition and the teeth.**—*Proc. Nutr. Soc.* **18,** 54-59. **2595**

Dietary factors relating to calcification of the teeth in lab. animals and man are reviewed. In man, provided that the diet contains adequate calcium, the only important single factor appears to be vitamin D.—M.G.G.

PAYNE, W. J. A. (1959). **A possible vitamin E deficiency occurring in a herd of pigs fed standard rations in the tropics.** — *Nature, Lond.* **183,** 828-829. **2596**

In the Fiji Islands occasional baby piglets are born exhibiting symptoms of muscular weakness and incoordination in one or more legs. The sows are fed a standard ration containing 40 or 45 parts of coconut meal. Two severely affected piglets recovered after being drenched with 50 mg. of vitamin E. A dose of 250 or 500 mg. of vitamin E was given to a group of sows 3 weeks before term; none of their 246 piglets born alive had muscular weakness, whereas 6 of 228 live piglets born to untreated sows were affected. One piglet was killed and examined histologically, but no lesions of muscular dystrophy were found. It is considered that the disease is caused by vitamin E deficiency, possibly due to the high proportion, in the diet, of coconut meal which is usually slightly rancid. [See also *V.B.* **23,** 3145.]
—M.G.G.

MACHLIN, L. J., MEISKY, K. A. & GORDON, R. S. (1959). **Production of encephalomalacia in chickens fed aerated heated fats.** — *Fed. Proc.* **18,** 535. [Authors' abst. modified.] **2597**

Commercially available refined fats were aerated at 160° to 170°C. for 4 days and then fed to week-old chicks. A purified diet containing 20% of the heated fat was used. In the absence of vitamin E or antioxdants, feeding heated cotton-seed oil resulted in death of 100% of the birds from encephalomalacia in less than 2 weeks. Lower mortality was observed in birds fed heated maize oil or peanut oil and no symptoms were found in groups receiving heated cod-liver oil, wheat germ oil, olive oil, beef tallow, or a mixture of oleic and linoleic acids. Addition to the diet of 100 i.u. of vitamin E per lb. or 0·05% Santoquin prevented the encephalomalacia. The saponifiable portion of heated cotton-seed oil produced the disease; the unsaponifiable portion had no effect.

BARBORIAK, J. J., COWGILL, G. R. & WHEDON, A. D. (1958). **Testicular changes in pantothenic acid-deficient rats.**—*J. Nutr.* **66,** 457-463. [Authors' summary modified.] **2598**

Severe pantothenic acid deficiency in growing rats caused histopathological changes in the testes. Especially characteristic was degeneration of the glandular interstitial tissue. In deficient rats given *bis*-(N-pantoyl-beta-aminoethyl)-disulphide, an antagonist of pantothenic acid, the testicular damage appeared earlier and was more severe.

WOSTMANN, B. S., KNIGHT, P. L. & REYNIERS, J. A. (1958). **The influence of orally-administered penicillin upon growth and liver thiamine of growing germfree and normal stock rats fed a thiamine-deficient diet.**—*J. Nutr.* **66,** 577-586. [Authors' summary modified.] **2599**

Procaine penicillin G (50 mg./kg. of diet) was administered to young germ-free and normal rats on a thiamine-deficient diet. Normal rats showed continued, though retarded growth, while untreated controls started to lose weight after 2 weeks, and died between the 6th and 10th weeks. Penicillin had no effect on the germ-free rats. They began to lose weight after 2 weeks, and died after 4–5 weeks. Obviously, the action of pencillin is on the intestinal flora, and thiamine synthesized under the influence of the antibiotic is available to the host.

WRIGHT, E. & SINCLAIR, D. P. (1958). **The goitrogenic effect of thousand-headed kale on adult sheep and rabbits.**—*N. Z. J. agric. Res.* **1,** 477-485. [Authors' summary modified.] **2600**

Ewes that produced goitrous lambs as a result of grazing thousand-headed kale (*Brassica oleracea* var. *acephala*) during pregnancy also suffered interference with their thyroid functions. Adult rabbits were similarly affected by kale. Radio-iodine in the thyroids of sheep grazed on kale was discharged by oral administration of potassium thiocyanate, indicating that the goitrogen was of the thiouracil type.

KALTER, H. & WARKANY, J. (1959). **Experimental production of congenital malformations in mammals by metabolic procedure.**—*Physiol. Rev.* **39**, 69-115. **2601**

A review of 353 publications on the production of congenital malformations by vitamin deficiency, amino-acid deficiency, fasting, nucleic acid antagonists, hormones, trypanblue, atmospheric changes, and other factors.—R.M.

SINCLAIR, D. P. & ANDREWS, E. D. (1958). **Prevention of goitre in new-born lambs from kale-fed ewes.**—*N. Z. vet. J.* **6**, 87-95. **2602**

Further studies on the prevention of goitre in the lambs of ewes fed kale revealed that giving pregnant ewes a single dose of 360 mg. potassium iodate did not prevent goitre. However, two doses each of 280 or 360 mg., administered at the beginning of the 4th and 5th months of pregnancy, gave adequate protection. Alternatively goitre could be prevented by offering to pregnant ewes salt licks containing 5 oz. potassium iodate to the ton. [See also *V.B.* **25**, 1743.]—R.M.

ANON. (1959). **Endemic goitre.**—*Brit. med. J.* January 3rd, 36-37. **2603**

Goitre occurs in man in almost every country in the world and is usually found where the iodine content of the soil is low. Other factors are the presence of goitrogenic substances such as fluorine, calcium and vinyl-thio-oxazolidone. The last can occur in the milk of cows fed on kale. The disease can be prevented by the addition of iodized salt to the diet to provide a daily intake of iodide of not more than 200–300 μg. This is now done in some countries, but still not in Gt. Britain.—M.G.G.

BRUNSTAD, G. E. & FOWLER, S. H. (1959). **Thyroid status and embryonic mortality in swine.**—*Amer. J. Physiol.* **196**, 287-290. **2604**

One group of 10 gilts was fed a ration containing 0·15% thiouracil, another was fed 0·0123% thyroprotein and a third was given a normal ration. The experiment commenced at first oestrus. The gilts were mated at the third oestrus and were slaughtered 38 days after coitus. There were no significant differences between ovulation rate, embryonic mortality or the number of normal embryos in the 3 groups, although there was slight reduction in ovulation rate and embryonic mortality in gilts receiving thyroprotein.—R.M.

VUORINEN, R. (1959). Paresis puerperalis ja tautitilaan liittyvistä komplikaatioista. Diagnoosiin ja terapiaan liittyviä kokemuksia praktiikasta. **[Puerperal paresis and its complications.]**—*Finsk VetTidskr.* **65**, 10-25. [In Finnish. Abst. from English summary.] **2605**

The author claimed good results for the treatment of puerperal paresis in 599 cows and other disorders by i/v inj. of 400–900 ml. of a solution composed of 1·5 g. potassium chloride, 2·5 g. calcium hypophosphite and 15 g. glucose in 100 ml. of water. An alternative solution contained 1·5, 3·5 and 25 g. of the ingredients, respectively.—R.M.

STILINOVIĆ, Z. (1958). Terapija primarne ketoze i kortizon. **[Cortisone therapy in primary ketosis.]**—*Vet. Glasn.* **12**, 885-895 & 974-980. [In Croat. Summary in English.] **2606**

S. studied blood-sugar conc., ketone body content in blood and urine, protein metabolism, electrolyte metabolism, oxalic acid content of blood and urine, specific gravity, fat content and acidity of milk and the blood picture in six cows with primary and one with fasting ketosis. Cortisone treatment in doses of 0·6 and 2 mg./kg. body wt. cured three cows. Cortisone did not remove ketone bodies completely. Primary ketosis may be present without signs of adrenocortical insufficiency, and *vice versa* adrenocortical insufficiency is a frequent complication but not the primary cause of ketosis.—E.G.

MATRONE, G., RAMSEY, H. A. & WISE, G. H. (1959). **Effect of volatile fatty acids, sodium and potassium bicarbonate in purified diets for ruminants.**—*Proc. Soc. exp. Biol., N.Y.* **100**, 8-11. [Authors' summary modified.] **2607**

In lambs triacetin could not replace acetate salts in a purified diet, and butyrate could be omitted. Butyrate was found in the same amount in the rumen contents irrespective of its presence in the diet. Growth was obtained on simplified diets supplying energy as carbohydrate or triacetin if sodium and/or potassium were added.

ANON. (1958). **Fungus shown capable of producing characteristic liver damage.**—*N. Z. J. Agric.* **97**, 328-329, 331, 333, 335 & 337. **2608**

An illustrated account of the work of the team of scientists at the Soil Bureau of the D.S.I.R. and the Ruakura Animal Research Station which led to the finding that a fungus isolated from hepatotoxic grass produced liver lesions in g.pigs like those found in sheep with facial eczema. The fungus was subsequently found to produce typical facial eczema when

fed to lambs. [In this article the fungus is designated *Stemphylium botryosum*: it was subsequently designated *Sporidesmium bakeri*.]
—E. G. WHITE.

THORNTON, R. H. & PERCIVAL, J. C. (1959). **A hepatotoxin from *Sporidesmium bakeri* capable of producing facial eczema diseases in sheep.**—*Nature, Lond.* **183,** 63. **2609**

Mycelial felts, spores and medium from cultures of a high-sporing strain of *Sporidesmium bakeri* produced liver lesions in g.pigs like those resulting from feeding hepatotoxic grass. Similar material produced liver lesions in lambs like those in facial eczema and also a clinical case in which typical icterus and photosensitization occurred.—E. G. WHITE.

CRAWLEY, W. E. & DODD, D. C. (1959). **A bacterium with fungicidal activity.**—*Nature, Lond.* **183,** 63-64. **2610**

A strain of *B. subtilis* with a marked inhibitory effect on the growth of the fungus *Sporidesmium bakeri*, the source of the hepatotoxin causing liver damage in facial eczema, has been isolated.—E. G. WHITE.

See also absts. 2618 (heart disease); 2706 (report); 2712 (book).

DISEASES, GENERAL

SEMELLINI, L. (1958). Alcune osservazioni sulla patologia spontanea del nutria (*Myopotamus coypus* Mol.) allevato in cattività. **[Diseases of nutria.]** — *Nuova Vet.* **34,** 76-84. [Summaries in English, German and Spanish.] **2611**

Literature on diseases of nutria is reviewed and personal observations are recorded and discussed. Diseases studied are septicaemia (due to various bacteria and fungi), salmonellosis and strongylosis.—T.E.G.R.

VAN BEMMEL, A. C. V. & PETERS, J. C. (1958). Overzicht van de geboorten en sterfgevallen onder de levende have van de Koninklijke Rotterdamse Diergaarde in het jaar 1957. **[Survey of births and deaths among animals at Rotterdam zoo during 1957.]** — *Tijdschr. Diergeneesk.* **83,** 869-876. [In Dutch. Summaries in English, French and German.] **2612**

Mortality among primates was unusually high: 31 of 65 died. Many of the deaths were in new arrivals; there was one case of listeria infection, one of TB., and 3 of pseudotuberculosis. Infectious leucopenia of Felidae was adequately controlled by triple inoculation of a formolized vaccine. Six Watoesi (Ankole) cattle reacted to the tuberculin test and were slaughtered: except in one case lesions were confined to lymph nodes. There were no deaths from helminth infestations in mammals and various anthelmintics were used. *E. coli* infection was controlled by inoculating all new-born ruminants with immune serum.—R.M.

SIEBURTH, J. McN. (1958). **Respiratory flora and diseases of Antarctic birds.** — *Avian Diseases* **2,** 403-408. **2613**

During the 1957–58 Argentine Antarctic Expedition, microbiological studies on Antarctic birds were carried out. The results of serological tests for salmonellosis and psittacosis are given, with observations on the respiratory flora.

Serological tests on 24 birds revealed evidence of psittacosis in three Sheath-bills and salmonellosis in four birds of three species. The livers and intestines of 17 birds which were cultured, however, were negative for salmonellosis.

The respiratory flora of ten birds was investigated: six penguins showing no gross lesions, and four flying birds showing tracheitis. No aerobic flora could be detected from the penguins but in three of the other birds, bacteria were isolated which were mildly pathogenic to chickens, viz. *Escherichia coli* from two specimens and *E. intermedia* and *Proteus vulgaris* from one. Antibodies to pleuropenumonia-like organisms could not be detected in the serum from seven penguins and four flying birds.

The methods and materials used are briefly described and the significance of the findings discussed.—I. F. KEYMER.

KEYMER, I. F. (1958). **A survey and review of the causes of mortality in British birds and the significance of wild birds as disseminators of disease. Part II.** — *Vet. Rec.* **70,** 736-740. **2614**

A review of the literature on diseases of wild birds, other than those encountered during the author's survey described in part I of the paper [*V.B.* **29,** 203].—R.M.

ROEMMELE, O. (1959). Wildseuchen und Revierhygiene in Niedersachsen. **[Diseases of game in Lower Saxony.]**—*Dtsch. tierärztl. Wschr.* **66,** 118-121. [Summary in English.] **2615**

The most widespread diseases of wild animals in Lower Saxony are rabies, chiefly in foxes and deer, coccidiosis in hares and rabbits, and myxomatosis. Deer are often infested with lungworms, gastro-intestinal worms, liver flukes, and warbles.—M.G.G.

ECKELL, O. A. & ANAYA, J. S. (1958). Sobre la enfermedad de San Antonio de la Paz. [**"San Antonio de la Paz disease" of horses, donkeys and mules in Argentina.**]—*Rev. Vet. Milit., B. Aires* **6**, 67-74. **2616**

A chronic nervous disease affecting about 80% of horses, donkeys and mules in the San Antonio de la Paz district and other districts in Catamarca province was investigated for two years. The disease had been present for about 10 years, but the incidence had recently increased; the animals affected were mostly over 3 years old. Severe atrophy of the muscles of the back developed, sufficient to prevent horses from being used in harness or saddle. A second stage of the disease was characterized by tremor of isolated muscles. Some cases developed dysphagia with slow mastication and forced swallowing. Advanced cases had protrusion of the third eyelid, sufficient to impede vision, and were in a state of tetany with increased reflex response. Pathological examination revealed "meningo-myelitis pigmentaria infiltrativa" (not described in detail). Attempts to demonstrate virus in brain, and to transmit the disease by inoculation of 2 horses with blood from a typical case, failed. No bacterial cause could be found; tests for botulinus toxin were negative. A search was made for vegetable or mineral toxins, so far without result. Treatment with antibiotics, vitamins or arsenic had no effect.
—R.M.

MATOV, K., VASILEV, I., OSIKOVSKI, E. & YANCHEV, Y. (1958). [**Role of micro-onchocercae in the aetiology of equine periodic ophthalmia.**]—*Izv. Inst. Pat. Zhivotni, Sofia* **6**, 315-326. [In Bulgarian. Summaries in German and Russian.] **2617**

Adult *Onchocerca cervicalis* were found in the ligamentum nuchae of 345 out of 427 horses (287 healthy and 121 with periodic ophthalmia). Onchocerca larvae were present in the eyes of 92% of infected horses, and in about the same numbers whether the horses had periodic ophthalmia or not. They were also present in the eyes of 8 out of 41 donkeys; periodic ophthalmia has not yet been diagnosed in donkeys in Bulgaria. It was concluded that there was no relationship between the parasite and the eye disease.—R.M.

GABRASCHANSKY, P., DIMITROW, S., SIMOW, I. & LALOW, N. (1958). Untersuchungen über die Herzkrankheiten hochproduktiver Kühe. I. Mitteilung: Klinik und Pathogenese der Myokardose. [**Heart diseases in high yielding cows. I.**]—*Mh. VetMed.* **13**, 756-758. **2618**

Slight inflammatory cardiac lesions and dystrophy of heart muscle fibres were diagnosed by clinical, laboratory and electrocardiographic methods in 26 of 320 high yielding cows. Their diet, regarded as the main cause of the condition, was rich in concentrates. The electrocardiograms were discussed.—E.G.

TSIROYANNIS, E. (1957). [**Pathology of nephritis in animals, particularly maculate nephritis of slaughtered calves.**] — *Epistēm. Epet. ktēniatrik. Schol., Thessaloniki* **2**, 69-251. [In Greek. Abst. from French summary.] **2619**

This is a detailed study with 73 illustrations of white spotted kidneys in calves. The condition was found in 1,376 of 45,000 calves slaughtered in Belgium. 250 pairs of kidneys were examined histologically and bacteriologically. It was considered that the lesions were caused by an allergen or allergens of unknown origin.
—R.M.

SHIRLAW, J. F. (1959). **The pneumonias of the sheep with special reference to enzootic pneumonia and jaagsiekte.** — *Vet. Rev. Annot.* **5**, 37-57. **2620**

A discussion of the literature on the various types of pneumonia (including enzootic pneumonia, jaagsiekte and tuberculosis) which occur in sheep.—R.M.

ENCHEV, S., TOMOV, T. & IVANOV, I. (1958). [**Pulmonary adenomatosis of sheep in Bulgaria.**] — *Izv. Inst. Pat. Zhivotni, Sofia* **6**, 365-367. [In Bulgarian.] **2621**

The first outbreak of pulmonary adenomatosis in Bulgaria was recorded in 1955. It affected 40 of 1,500 sheep. In 3 subsequent outbreaks between 1 and 3% of sheep were affected. Diagnosis was based on the histology of lung lesions.—R.M.

MAAS, A. (1958). Zur Ätiologie des enzootischen Herztodes der Schweine.. [**Aetiology of enzootic heart failure (fatal syncope) in pigs.**]—*Arch. exp. VetMed.* **12**, 82-124. **2622**

From nine series of transmission experiments in 93 pigs and a number of rabbits, g.pigs and mice, it was concluded that fatal syncope of pigs is not caused by an infective agent. Feeding experiments in 93 pigs from syncope-free herds proved that vitamin or protein deficiency, faulty nutrition and management were not the cause of the disease. Heredity and endocrine disturbances were excluded as aetiological factors. The primary cause of the disease appeared to be a specific, so far unidentified allergen, probably contained in the food.—E.G.

BELLÁN, G. (1958). A sertések ún. tüdővizenyője gyógykezelésének új módjai. **[Chemotherapy of lung oedema in pigs.]**—*Mag. állator. Lapja* **13,** 209-211. [Summaries in English and Russian.] **2623**

B. described results of experiments on the therapy of lung oedema of pigs. In 15 early cases 15–25 ml. of 4% formaldehyde solution given i/m prevented the development of lung oedema. Of 126 pigs showing severe symptoms of lung oedema 120 recovered after daily doses of 4–6 mg. per kg. body weight procaine in 1–4% solution, in injections repeated every 8–12 hours. 3–5 doses of a French "lytic mixture" (each dose containing 100 mg. pethidine, 50 mg. chlorpromazine and 50 mg. promethazine in 10 ml. twice-distilled water), injected i/m into 10 pigs showing very severe symptoms of lung oedema, gave rapid and complete recovery, and had beneficial effects on extra-pulmonary symptoms in all cases. Of 10 pigs treated with corticotrophin only 7 recovered. The author considered that the "lytic mixture" gave the most satisfactory result.—A. SEBESTENY.

BEHRENS, H. & SCHULZ, L. C. (1958). Stallenzootisch auftretende Rückenmarkserweichung (Poliomyelomalazie) bei Schweinen. **[Endemic poliomyelomalacia in pigs.]**—*Dtsch. tierärztl. Wschr.* **65,** 555-559. [Summary in English.] **2624**

Four outbreaks of poliomyelomalacia in pigs, a disease of unknown aetiology, apparently not associated with nutrition, breed or environment, were described. 27 of 72 pigs had locomotor disturbances of varying severity affecting the hind quarters, one paralysis of the fore legs and two paralysis of both fore and hind legs, with tonic-clonic spasms in one pig. In eight there was bilateral exophthalmus and midriasis. All were nervous and squealed when handled. Five died. Treatment with calcium, streptomycin and vitamins A, B, D and E failed. Most piglets in this piggery developed between 2–5 weeks of age an infectious rhinitis from which they recovered. Atrophic rhinitis was not observed. *Haemophilus suis* was isolated from the nasal discharge of one piglet killed when four weeks old. During the second outbreak a few months later on the same premises, 15 of 24 developed posterior paresis or paralysis but not exophthalmus. Three more died suddenly without clin. symptoms. Serological tests for leptospirosis were negative. Two further outbreaks, involving two weanlings of a litter of eight and 112 of 303 pigs, slaughtered because of either poliomyelomalacia or bronchpneumonia were described.

It was believed that the characteristic degenerative lesions in the grey substance of the cord were produced by circulatory insufficiency associated with shock, affecting the supply of blood to the central and peripheral nervous system. Disturbances in vascular wall permeability, as in periarteritis nodosa and collagen diseases were typical of the adaptation syndrome.

Differential diagnosis from swine fever, Teschen disease, Talfan disease, Aujeszky's disease, spinal TB., oedema disease, deficiency diseases, parasitic infestation, etc. was discussed. [See also *V.B.* **26,** 2388.]—E.G.

BÖRNFORS, S. (1958). **Acanthosis nigricans in dogs. A study of aetiology and medical treatment with special attention to hypophyseal-thyroid function.**—*Acta endocr., Copenhagen* Suppl. No. 37. pp. 63. [Thesis, Stockholm.] [In English.] **2625**

It was observed that the thyroid activity of dogs with acanthosis nigricans was usually depressed. Further experiments showed that this was probably caused by primary depression of secretion of thyrotropic hormone by the pituitary gland. The curative action of thyroxine and thyrotropic hormone was confirmed. Acanthosis did not occur in dogs in which hypothyroidism was induced by prolonged oral administration of methylthiouracil.—R.M.

KIRK, R. W. (1958). **The therapeutics of canine uremia.**—*Pap. 8th Gaines vet. Symp.* pp. 12-15. [New York: Gaines Dog Research Center.] **2626**

K. described a technique for performing peritoneal lavage with a special solution containing sodium chloride and other electrolytes, sugars and antibiotics. He discussed the application of this treatment in chronic uraemia and acute renal insufficiency.—IRENE M. DIXON.

KIRKMAN, H. & KIRKMAN, G. T. (1958). **A nail found within a hen's egg.** — *Nature, Lond.* **181,** 1159-1160. **2627**

A nail about 1·5 cm. long was found in the albumen of a hen's egg, and it is suggested that it entered the egg after penetration of the walls of the intestines and oviduct.

—W. E. PARISH.

IYER, P. K. R., PATHAK, R. C. & SINGH, A. (1959). **Observations on round heart disease in fowls.**—*Indian vet. J.* **36,** 1-5. [Authors' summary modified.] **2628**

The occurrence of "round heart disease" among fowls has been recorded for the first time

in India. The symptoms, pathology and histopathology were described and the probable aetiological factors discussed.

PORTER, K. A. & COUCH, N. P. (1959). **Marrow treatment of irradiated dogs.**—*Brit. J. exp. Path.* **40,** 52-56. [Authors' summary modified.] **2629**

Bone marrow transplantation between mongrel dogs was attempted after X-irradiation of the recipients. Temporary transplants of donor marrow and survival of the recipient were observed in one of 8 dogs given 450 r and 3 of 8 dogs given 500 r. Although there was evidence of an initially successful homograft in 4 of 8 dogs exposed to 600 r and 2 of 5 receiving 700 r, all soon died from intestinal damage. No permanent transplants were achieved.

CHANG, M. C. & HUNT, D. M. (1959). **Lethal effects of gamma radiation in the ferret.** — *Fed. Proc.* **18,** 25. **2630**

Eleven ferrets, 35 days old to adult age, were irradiated with 500, 750, or 1,000 r. All died after 4–7 days. R.b.c. decreased gradually in number to 20–60% of that before treatment, while w.b.c. decreased sharply immediately after irradiation and disappeared within 3–5 days in some animals. As the proportion of lymphocytes decreased, that of neutrophiles increased.—M.G.G.

GLASER, W. & BRANDT, J. L. (1959). **Localization of magnesium-28 in the myocardium.**—*Amer. J. Physiol.* **196,** 375-376. **2631**

Radioactive Mg was inj. i/v into anaesthetized animals (5 dogs, 6 rabbits and 2 calves) in a single dose of 1·3–9·7 μc/kg. body wt. The animals were killed between 1 and 3 hours after inj. and the concentration of Mg^{28} in various parts of the myocardium was determined. The conc. in myocardium was about 10 times greater than that in skeletal muscle; the intraventricular septum had a higher conc. than the walls of the left or right ventricles.—R.M.

LARSON, B. L. & EBNER, K. E. (1958). **Significance of strontium-90 in milk. A review.**—*J. Dairy Sci.* **41,** 1647-1662. **2632**

This review describes the principal radioactive isotopes from nuclear explosions, the pathway of Sr-90 from atmosphere to man, the concentrations of Sr-90 in milk and vegetable foods in different countries, and the sources of dietary Ca and estimated intake of Sr-90 in human populations in different parts of the world. Populations obtaining most of their Ca from milk ingest less Sr-90 than those obtaining most of their Ca from vegetable and cereals, because the gut, kidney and udder of the cow discriminate against Sr in favour of Ca. If testing of nuclear devices were to continue at the present rate, the concentration of Sr-90 in human bone would rise to between 4 and 21 S.U. At Denver, Colorado (5,000 ft. above sea level), the dose from cosmic rays is about 8 S.U. greater than in Washington, but public health records show that this is not strong enough to cause leukaemia and bone cancer. —M.G.G.

GUILD, W. R. (1958). **Hazards from isotopic tracers.**—*Science* **128,** 1308. **2633**

Tritiated thymidine and other nucleic acid precursors are used as radioactive tracers. Since, in some organisms, thymidine is incorporated largely, if not exclusively, into deoxyribonucleic acid and remains there, tritiated thymidine could give chromosomes a dose of radiation 50 to 50,000 times greater than that given by an equal activity of tritiated water.—M.G.G.

See also absts. 2706 (report); 2713 & 2714 (books).

POISONS AND POISONING

ANON. (1959). **Stream pollution damages awarded.** — *J. Amer. vet. med. Ass.* **134,** 112. **2634**

Damages were awarded to an owner of livestock in Oklahoma for death of cattle and for injury to cattle resulting from drinking from a stream which allegedly became polluted as a result of an oil company's operations which caused salt to be released into the stream.

TODD, J. R. & GRACEY, J. F. (1959). **Chronic copper poisoning in a young heifer.** — *Vet. Rec.* **71,** 145-146. [Authors' summary modified.] **2635**

Chronic copper poisoning in a 9-month-old heifer is recorded, in which death was preceded by icterus and haemoglobinuria. P.M. examination revealed a generalized jaundice. The liver on section was bright yellow, and contained 1,600 p.p.m. of Cu (dry weight). The source was a pig meal containing 250 p.p.m. Cu of which the animal had received 4 lb. daily for the past 5 months.

FLEMING, G. A. & WALSH, T. (1957). **Selenium occurrence in certain Irish soils and its toxic effects on animals.**—*Proc. R. Irish Acad.* **58,** Sect. B. 151-166. **2636**

The occurrence of chronic selenium poisoning in animals is reported from three counties in the Republic of Ireland: Limerick, Tipperary and Meath. The selenium content of the soil was up to 1,200 p.p.m. Spontaneous and experimental poisoning was described. The authors were able to recognize affected areas by a characteristic pungent odour which emanated from the soil and herbage.—R.M.

OLIVER, W. T., GEIB, L. W. & SORRELL, B. (1959). **Lead poisoning in a dog.**—*Canad. J. comp. Med.* **23**, 21-22. [Summary in French.] **2637**

Lead poisoning in a dog is described which resulted from eating linoleum. Symptoms included listlessness, inappetence, vomition, constipation followed by diarrhoea, muscular spasms and convulsions. Acidophilic, acid-fast inclusion bodies in the nuclei of renal parenchymal cells, degenerative changes in the Purkinje cells, together with degenerative changes in the parenchymal organs, and cerebral oedema, are regarded as characteristic of lead poisoning in this species.—C. L'ECUYER.

MAPLESDEN, D. C., MOTZOK, I., OLIVER, W. T. & BRANION, H. D. (1958). **Fluorosis—A review and field observations.** — *Canad. J. comp. Med.* **22**, 427-432. [Summary in French.] **2638**

A review of the literature on fluorosis (chronic fluorine poisoning) is presented. Symptoms, methods of diagnosis and sources of fluorine are described. Several clinical cases in Ontario herds are discussed as to sources of excess fluorine.—C. L'ECUYER.

PEIRCE, A. W. (1959). **Studies on the fluorosis of sheep. 3. The toxicity of water-borne fluoride for the grazing sheep throughout its life.** — *Aust. J. agric. Res.* **10**, 186-198. [Author's summary modified.] **2639**

Three groups of lambs were given water containing the same three different levels of fluorine, added as sodium fluoride, that their mothers had received during pregnancy and lactation. Group A (control: 21 wethers and 11 ewes) received water containing about 0·3 p.p.m. F, group B (17 wethers) water containing 10 p.p.m. F, and group C (20 wethers and 10 ewes) 20 p.p.m. F. The ewes were mated each year, and the experiment was terminated when they reached 7 years of age.

During winter little water was drunk. In summer the daily intake of water by groups B and C rose to 4 litres, equivalent to 40 and 80 mg. F, respectively. Their overall mean daily intake was 14 and 27 mg. F respectively.

Water containing 10 p.p.m. F appeared to have no adverse effects on health, but decreased wool production and induced characteristic changes in the teeth. Water containing 20 p.p.m. F affected health and wool production, and induced more severe changes in the teeth. Neither concentration affected reproductive performances. Increases up to threefold were observed in the fluoride content of the bones and teeth.

The implications of the findings are discussed, particularly in relation to flock management in Queensland.

REINHARD, H. (1959). Die Fluorschäden im unteren Fricktal. **[Industrial fluorine poisoning in Fricktal, Switzerland.]** — *Schweiz. Arch. Tierheilk.* **101**, 1-14. [Summaries in English, French and Italian.] **2640**

Fluorine poisoning in cattle in Fricktal is caused by an aluminium factory emitting about 500 kg. of F daily in the form of hydrogen fluoride and silicon tetrafluoride. The symptoms are lameness, emaciation, reduced milk yield, apathy, exostoses of the bones, especially the ribs, abnormalities of the teeth, and reproductive disorders. The bone ash of affected cattle from certain districts often contains over 300 mg.% F, but the average content is 40 mg.%. Severe clin. symptoms develop even in cattle with less than 100 mg.% F in the bone ash, which indicates another, unknown factor. The F content of the urine is usually over 2 mg. per litre and sometimes over 10 mg./l. In hay and grass the F concentration is usually between 2 and 5 mg.%, and cattle eating it develop severe clin. symptoms. In one district, since 1955, 572 or 47% of the cattle have had to be slaughtered and their owners compensated. Feeding magnesium sulphate does not prevent symptoms, but phosphate and calcium preparations and oxytocin alleviate them.—M.G.G.

COOMBE, J. B. & TRIBE, D. E. (1958). **Toxicity of urea to sheep.** — *Nature, Lond.* **182**, 116-117. **2641**

An experiment on sheep was carried out to determine whether concentrations of urea previously said to be toxic when given as one dose, could be fed safely if the urea was administered over a period of 24 hours. When 100 g. of urea was fed with the hay, samples were taken periodically from the rumen for analysis of the ammonia concentration, and at no time did it rise above the safe limit of 80 mg. ammonia nitrogen/100 ml.—W. E. PARISH.

TOZZINI, F. (1958). L'avvelenamento del bestiame da composti organici fosforati.

[**Poisoning with organic phosphorus compounds in animals.**] — *Zooprofilassi* **13**, 849-854. **2642**

A general account.—T.E.G.R.

ROSSMANN, W. (1959). Gesundheitsstörungen durch Gelbspritzmittel in einem Schweinebestande. [**Abortion in sows caused by an insecticidal fruit tree spray containing dinitro-*ortho*-cresol.**]—*Dtsch. tierärztl. Wschr.* **66**, 41-42. [Summary in English.] **2643**

Abortions, stillbirths, and slow growth in pigs were attributed to the bedding, which consisted of rape obtained from an orchard where the trees had been sprayed with a dinitro-*ortho*-cresol. Bacteriological and serological tests were negative for brucellosis.—M.G.G.

CHRISTIE, G. S. (1958). **Liver damage in acute heliotrine poisoning. I. Structural changes. II. Biochemical changes.**—*Aust. J. exp. Biol. med. Sci.* **36**, 405-412 & 413-424. **2644**

I. Histological changes in rat liver which follow a single, large dose of heliotrine are described.

Coagulative necrosis is evident in patches within an hour of i/p administration and involves the middle and inner zones of the liver lobules by the 20th hour. At 24 hours only a small rim of periportal cells survives.

Before necrosis is apparent, mitochondria fail to stain and the cytoplasm becomes swollen with water, fat droplets and inclusion globules. Fat droplets are due to infiltration of mitochondria by neutral fat.

Haemorrhage into necrotic areas results from the destruction of sinusoids and gives the liver an intensely engorged appearance macroscopically.

Liver regeneration and megalocytosis are not observed in such acute experiments.

II. Liver weight per 100 g. body weight increases progressively after an initial fall to the 10th hour following i/p inj. of a single large dose (320 mg./kg. body wt.) of heliotrine.

Diphosphopyridine-nucleotide (DPN) dependent respiratory enzymes lose activity suddenly at about the 16th hour post injection and disorganization of tricarboxylic acid activity results. Extensive histological necrosis rapidly follows.

Succinoxidase and choline oxidase activities and anaerobic glycolysis persist at high levels in livers with advanced histological necrosis.

Reactivation of tricarboxylic acid enzymes is achieved by the addition of DPN to the reaction mixture.—C. H. GALLAGHER.

EVANS, W. C., EVANS, I. A., CHAMBERLAIN, A. G. & THOMAS, A. J. (1959). **Studies on bracken poisoning in cattle. Part VI.**—*Brit. vet. J.* **115**, 83-85. [Authors' summary modified.] **2645**

A toxic principle was extracted from the bracken fern in hot water, and concentrated. A calf drenched with this fraction developed clinical bracken poisoning. Bracken poisoning did not develop in a calf fed green male-fern fronds (*Aspidium filix-mas*) for a month.

GASPARE, V. & ANTONINO, C. (1958). Modificazioni del latte in capre alimentate con acetosella (*Oxalis acetosella*). [**Changes in the milk of goats fed sorrel** (*Oxalis acetosella*). —*Acta med. vet., Napoli* **4**, 443-448. [Summaries in English, French and German.] **2646**

There were no significant changes in the composition of milk of 5 goats kept exclusively on sorrel for five weeks. There was a diminution in the yield which, in one animal, dropped to below half of that at beginning of the experiment.—T.E.G.R.

GALLO, G. G. (1958). Acción tóxica de Colliguaya integérrima sobre ovinos y caprinos de nuestra Patagonia. [**Toxicity of *Colliguaya integerrima* for sheep and goats.**]—*Rev. Vet. Milit., B. Aires* **6**, 75-85 & 122-133. **2647**

This plant, a member of the Euphorbiaceae, occurs in the west of Patagonia. The toxic principle was a saponin and the toxicity of the plant varied: sheep invariably died when fed the plant in the period November–April (during flowering and fruiting). The presence of gastro-intestinal parasites appeared to facilitate poisoning. Details of experimental poisoning are given.—R.M.

WHITE, E. P. (1958). **Photosensitivity diseases in New Zealand. XIII. Substances isolated from concentrates of facial eczema grass.** — *N. Z. J. agric. Res.* **1**, 859-865. [Author's summary modified.] **2648**

The substance responsible for the beaker test reaction contains a major component of m.p. 260° C., probable formula $C_{26}H_{45}O_7N_3$. It was obtained from toxic pasture, the highest yield being 1 in 50,000. On hydrolysis it yields valine and leucine in a 1:1 ratio. An impure material causing a false beaker test reaction was isolated from pennyroyal (*Mentha pulegium*). The isoflavone formononetin was isolated from a non-toxic pasture.

ANON. (1958). **Facial eczema. Precautions and warning system for this season.** — *N. Z. J. Agric.* **97**, 511-512. **2649**

As it was unlikely that new methods of controlling facial eczema would be available before April 1959, the usual methods of feeding sheep on harmless crops or hay were recommended. The warning system for facial eczema is based on the following data: maximum and minimum temperatures of the air, minimum temp. of the grass, and temp. of the soil at a depth of 4 inches. Temperatures above normal increase the likelihood of facial eczema. As rainfall frequently varies within a district, farmers were advised to have their own rain gauges and to take precautions as soon as the warm autumn rains fell.—M.G.G.

See also absts. **2560** (radioactive contamination of food); **2561** (nitrate content of grass); **2608-2610** (Sporidesmium bakeri); **2630** (gamma radiation); **2633** (isotopes); **2693** (red clover); **2706** (report).

PHARMACOLOGY AND GENERAL THERAPEUTICS

(For treatment of specific infections see under the appropriate disease)

OTTE, E. (1959). **Blood groups and blood transfusion in domestic animals.**—*Brit. vet. J.* **115,** 71-82. [Author's summary modified.] **2650**

The present state of research in blood groups in animals is discussed. Normal antibodies occur in nearly all species of animals. Random transfusion is therefore liable to cause shock. Donors must be carefully selected; the difficulties of this are discussed. The use is recommended of universal plasma or of the so-called "large cross test" for compatible blood. The only practical solution of the problem is considered to be the replacement of whole blood by plasma and the establishment of plasma banks.

GASPARINI, G., RONCALLI, R. & PERSIANI, G. (1959). Gli enzimi in medicina veterinaria: applicazioni pratiche della dornasi pancreatica. **[Enzymes in veterinary medicine: pancreatic dornase.]**—*Veterinaria, Milano* **8,** 23-28. [Summaries in English, French, German, Spanish and Portuguese.] **2651**

The actions and uses of proteolytic enzymes are reviewed. An account is given of cases in which pancreatic dornase was used with satisfactory results in treatment of mastitis, metritis and suspected actinobacillosis.—T.E.G.R.

RICHTER, G. W. (1959). **The cellular transformation of injected colloidal iron complexes into ferritin and hemosiderin in experimental animals. A study with the aid of electron microscopy.**—*J. exp. Med.* **109,** 197-216. [Abst. from author's summary.] **2652**

The findings show that iron preparations used in therapy can be identified within cells, and that their intracellular disposition and fate can be followed at the molecular level. Considered in the light of previous work, they indicate that the characteristic structure of the ferric hydroxide micelles in molecules of ferritin is specific, and develops during the union of apoferritin with ferric hydroxide. Apparently this union does not depend upon specific cell components.

WOOLLEY, D. W. (1958). **Tranquilizing and antiserotonin activity of nicotinamide.**—*Science* **128,** 1277-1278. [Author's abst. modified.] **2653**

Nicotinamide in large amounts antagonized the action of serotonin on smooth muscle *in vitro* and in mice. It also tranquillized the mice. The antagonism differed from that of an antimetabolite of serotonin.

VOORSPUIJ, A. J. Z. & BOKMA, L. H. (1959). **The simultaneous action of two or more antibacterial agents. The action of the combination nitrofurantoin-chloramphenicol-erythromycin on *Proteus vulgaris*.**—*Antibiot. & Chemother.* **9,** 27-37. [Summary in Spanish p. 62. Authors' summary modified.] **2654**

The antibacterial potencies of combinations of two or more drugs *in vitro* may be compared with those of single drugs by two methods: (1) the action of the combination may be classified into categories, depending on the number of single drugs in the combination (the least number of possible categories is five and occurs with combinations containing two drugs); and (2) precise quantitative criteria reveal the action of any mixture to be either synergic, additive, or antagonistic. An "activity quotient" may be calculated from *in vitro* studies. The theoretical considerations are illustrated by a study of the combination nitrofurantoin–chloramphenicol–erythromycin *in vitro*; most of the mixtures are synergic. The mixture with the highest activity quotient and presumed optimal clinical activity could be deduced, but therapeutic effect depends also on drug concentration in body fluids. A standardization of terms and methods is overdue, and adoption of the proposals would resolve many difficulties besetting studies with combinations of agents.

ENGLISH, P. B. (1959). **Serum penicillin concentrations in the dog with fortified benzathine and benethamine penicillins.**—*Aust. vet. J.* **35,** 16-21. [Author's summary modified.] **2655**

Serum penicillin levels of two fortified long-acting penicillins were studied in 12 dogs in 42 trials each of 120 hours' duration.

S/c treatments with fortified benzathine preparation at rates of 25,000 and 50,000 units per kg. gave, respectively, mean penicillin concentrations of 8·80 μg./ml. and 11·45 μg./ml. at half an hour, and 0·04 μg./ml. and 0·07 μg. per ml. at 120 hours (5 days). I/m doses of 25,000 units/kg. produced levels essentially the same as those obtained by s/c treatment. A single dose of 25,000 units/kg. could produce useful clinical results for at least 5 days.

Fortified benethamine (25,000 units/kg., s/c), gave a mean conc. of 6·45 μg./ml. at half an hour and 0·10 μg./ml. at 120 hours.

SEWELL, I. A. & NICOL, T. (1958). **Effect of antibiotics on the phagocytic activity of the reticulo-endothelial system.** — *Nature, Lond.* **181,** 1662. **2656**

In order to test whether certain chemotherapeutic agents depend for their effectiveness on the action of phagocytes, 15 types of antibiotics were administered for 6 consecutive days to groups of male white mice and their phagocytic activity was then measured on the eighth day by the rate of disappearance of a known amount of carbon from the circulating blood. None of the antibiotics had a significant effect on the phagocytic activity of the reticulo-endothelial system.—W. E. PARISH.

See also absts. **2319 & 2320** (antibiotics in mastitis); **2341** (glucosulphone in Johne's disease); **2350** (nitrofurans and antibiotics in calf enteritis); **2372** (antibiotics, etc. in brucellosis); **2386** (antibiotics in tetanus); **2405** (trypanosomiasis); **2408** (antibiotics in avian trichomoniasis); **2414** (chlortetracycline in anaplasmosis); **2416** (toxoplasmosis); **2464** (penicillin in balanoposthitis); **2498** (chlortetracycline in psittacosis); **2504** (antibiotics in goat virus pneumonitis); **2526-2528** (chlorophos against warble fly); **2529** ("Neguvon"); **2532** (Bayer 21/199 for tick control); **2533** (lindane, etc.); **2537** (lime for destruction of liver fluke miracidia); **2539** (CCl_4, hexachlorethane, in fascioliasis); **2545** (bephenium embonate in nematodirus infestation); **2547** (cyanacethydrazide for lungworms); **2549** (cyanacethydrazide as an anthelmintic); **2572** (posthitis in sheep); **2606** (cortisones in ketosis); **2623** (lung oedema in pigs); **2626** (uraemia in dogs); **2691** (retained placenta); **2706** (report); **2715** (book).

PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

JOHNSON, H. D., RAGSDALE, A. C. & YECK, R. G. (1958). **Environmental physiology and shelter engineering. With special reference to domestic animals. XLIX. Effects of constant environmental temperatures of 50° and 80°F. on the feed and water consumption of Brahman, Santa Gertrudis, and Shorthorn calves during growth.**—*Res. Bull. Mo. agric. Exp. Sta.* No. 683. pp. 31. **2657**

A constant environmental temp. of 80°F. depressed feed consumption by Shorthorn and Santa Gertrudis calves, but not zebu calves, compared with feed consumption at 50°. During growth the Shorthorns had a higher water consumption per unit of body weight or per unit of surface area than zebu or Santa Gertrudis at both 50° and 80°. While zebu cattle gained weight as well at 80° as at 50°, Shorthorns took 5 months longer at 80° to reach the weight they reached at 50° and Santa Gertrudis took a month longer.—R.M.

MACFARLANE, W. V., MORRIS, R. J. H., HOWARD, B. & BUDTZ-OLSEN, O. E. (1959). **Extracellular fluid distribution in tropical Merino sheep.**—*Aust. J. agric. Res.* **10,** 269-286. [Authors' summary modified.] **2658**

Merino ewes and wethers maturing from 12 to 53 months of age were studied for 3½ years at Julia Creek (lat. 21° S.). Measurements were made of plasma volume and extracellular volume, plasma proteins, haemoglobin, haematocrit, and plasma electrolytes. The range of normal was very wide.

Large changes took place in the fluid volume during investigation; the changes appeared to be independent of seasons but to a great extent determined by nutrition. Poorly nourished sheep had increased extracellular fluid space, and the space shrank on improved pasture. Age and sex did not influence the fluid volumes. Lactation was associated with an increase in fluid space, and yard feeding with a decrease.

Non-tropical sheep introduced from lat. 30° S. during winter had similar fluid volumes to the tropical sheep when investigated 2 months after their arrival. Tropical Merinos at any age or season had larger plasma volumes than sheep kept in lab. pens in Brisbane or in Melbourne.

LYNE, A. G. & HEIDEMAN, M. J. (1959). **The pre-natal development of skin and hair in cattle. (*Bos taurus* L.)** — *Aust. J. biol. Sci.* **12,** 72-95. [Abst. from authors' summary.] **2659**

A histological study was made of the development of the skin and hair follicles in 33 foetuses, ranging in age from 68 to 274 days, and seven new-born specimens of various breeds of

Bos taurus. Extensive use was made of counts of the follicle and hair population as well as skin and hair measurements.

Follicle initiation extends from about the 77th day of gestation to about the 166th day. First-, later-, and last-formed follicle types are recognized and described. All the follicles are associated with sweat glands and nearly all with arrector pili muscles. The hairs of the first-formed follicles emerge at about the 200th day, and 20 days later most of the follicles have emerging hairs. In one foetus (251 days) and two of the new-born calves there were a few second-cycle follicles with emerging hairs.

Pairing of follicles has been observed where two (occasionally three) follicles, arising independently, share a common hair canal. Follicle group formation is not a common feature in cattle.

Some features in the development of skin and hair follicles in *B. taurus* are compared with those in the sheep, mouse and other mammals.

JARRETT, I. G. & FILSELL, O. H. (1958). **Hexokinase activity of sheep, lamb and rat tissue.**—*Aust. J. exp. Biol. med. Sci.* **36**, 433-440. **2660**

Hexokinase of intestinal mucosa and brain is assayed by glucose utilization/mg. defatted dry tissue.

Rat intestinal mucosa and brain have greater hexokinase activity than these tissues in sheep and lambs.

Unweaned lambs, ½–5 days old, have higher intestinal activity than new-born, unsuckled lambs, 7–35 day old lambs or adults.

The results are discussed in relation to possible differences between young lambs, older sheep and non-ruminants in the intermediary metabolism of carbohydrates.

—C. H. GALLAGHER.

AUGUSTINSSON, K.-B. & OLSSON, B. (1959). **Esterases in the milk and blood plasma of swine. I. Substrate specificity and electrophoresis studies. II. Activities at different stages during the lactation and suckling periods, and plasma arylesterase as a gene-controlled enzyme.**—*Biochem. J.* **71**, 477-484 & 484-492. **2661**

A butyrylcholinesterase of substrate specificity different from that of all other cholinesterases is present in high concentration in sow's milk; no other esterases are present. Swine plasma contains the same esterase, but in much lower concentration; in addition, an acetylarylesterase is present in high concentration in some plasmas and in very low concentration in others. There is no evidence so far that other types of esterases (aliesterases, lipases) are present in the plasma of swine. The present investigation was designed to study the esterase activities in colostrum, milk and plasma of the sow during the course of lactation and the activities in the plasma of her piglets during the suckling period. Special attention was directed to the frequency of high and low plasma arylesterase activity in the litter.

—R.M.

EBNER, K. E., HOOVER, C. R., HAGEMAN, E. & LARSON, B. L. (1959). **Synthesis of milk constituents by mammary gland tissue cultures.** —*Fed. Proc.* **18**, 220. [Authors' abst. modified.] **2662**

In vitro cultivation of mammary tissue has been accomplished using tissue from cows at various stages in the reproductive cycle. The preservation of "normal" function in some of these cultures has been suggested by their ability to proliferate under conditions designed to stimulate proliferation and then to synthesize milk constituents (*i.e.*, lactose and β-lactoglobulin) under conditions designed to stimulate secretion. Biochemical evidence for the net synthesis of milk constituents has been found both in short-term cultures a few days old and in stimulated cultures over a month old.

FISHER, E. W. & DALTON, R. G. (1959). **Cardiac output in cattle.**—*Nature, Lond.* **183**, 829. **2663**

Cattle were inoculated in the jugular vein with about 0·4 mg. of Evans blue per kg. of body wt., then blood samples were taken by direct puncture of the brachial artery at 1-sec. intervals for 30 sec. By this method, 26 determinations of cardiac output were made in 22 female Ayrshire cattle weighing 100–605 kg. Output ranged from 12 to 68 litres of blood per min., which gives an average value of 113 ml. per kg./min.—M.G.G.

BEGHELLI, V., BORGHI, G. & MATSCHER, R. (1958). Influenza delle sostanze azotate alimentari sul pH del contenuto ruminale. Ricerche sulla pecora. **[Effect of nitrogenous substances on the pH of rumen contents in goats.]** — *Arch. Vet. Ital.* **9**, 97-112. [Summaries in English, French, German and Spanish.] **2664**

Fluctuations in the pH of rumen contents were studied in sheep with permanent rumen fistulae. Results were in agreement with those obtained by Phillipson, A. T. [*V.B.* **13**, 1983].

—T.E.G.R.

METCALFE, J., MESCHIA, G., HELLEGERS, A., PRYSTOWSKY, H., HUCKABEE, W. & BARRON, D. (1959). **Transfer of oxygen across the sheep placenta at high altitude.**—*Fed. Proc.* **18,** 104. **2665**

In a study of maternal arterial and venous blood and foetal blood (from the umbilical vessels) a pattern of compensations (maternal and foetal) to the alveolar hypoxia of altitude was observed. At high altitude the Hb content of foetal and maternal blood was higher but maternal arterial blood contained less O_2, because of its lower saturation; the uterine venous blood contained more O_2 (at a slightly lower saturation), resulting in a decreased difference between arterial and venous O_2 across the pregnant uterus, and a lower mean percentage saturation of maternal blood in the uterus. O_2 saturation of the umbilical venous blood was equally high at high altitude and at sea level.—T.E.G.R.

SHEPARD, R. H., SLADEN, B., PETERSON, N. & ENNS, T. (1959). **The path of gases through the lungs and air sacs of the chicken.**—*Fed. Proc.* **18,** 142. **2666**

A comparative study of the pulmonary CO_2 and O_2 in expired gas and air sacs, and pulmonary O_2 in the blood of the left ventricle revealed that: (1) CO_2 and O_2 in air sacs varied little during the respiratory cycle—they fell after inj. of N_2 into the sacs but rapidly returned to original levels with each inspiration; (2) in ventricular blood and air sac gas the O_2 level was essentially the same and varied less than 50% of the total pulmonary O_2 during the respiratory cycle; (3) end-tidal CO_2 and O_2 were essentially the same as air sac CO_2 and O_2. These findings suggest that the path followed is mouth–lung–air sacs–mouth with an almost complete valve effect despite the absence of valves.

—T.E.G.R.

DONEY, J. M. (1959). **The effects of inbreeding on four families of Peppin Merinos. III. The influence of crude pituitary extract on inbred lambs.**—*Aust. J. agric. Res.* **10,** 97-107. [Author's summary modified.] **2667**

Treatment of inbred lambs with crude pituitary extract produced a highly significant increase in growth rate over the first 10 weeks when compared with untreated lambs. Continued treatment from 10 to 23 weeks of age caused no further change in growth rate. Differences between treated and untreated lambs in body wt. and size were maintained long after treatment ceased. Wool production was increased during treatment, but not after it ceased. Similar treatment produced no detectable response in non-inbred lambs. It is suggested that the effect of inbreeding is partially derived from a reduction in pituitary activity.

MANUNTA, G. & MARONGIU, A. (1958). L'attività delle surrenali nella vacca in lattazione. **[Activity of the adrenal glands in the lactating cow.]** — *Arch. Vet. Ital.* **9,** 223-228. [Summaries in English, French, Spanish and German.] **2668**

The ascorbic acid content of the adrenal cortex in dry non-pregnant cows was lower than that in non-pregnant cows towards the end of lactation. The difference ($P<0{\cdot}01$) is considered significant.—T.E.G.R.

BELL, J. T., JR. & WEBER, A. F. (1959). **A comparative study of lipid accumulation in the adrenal glands of mature nonpregnant dairy heifers, nonpregnant lactating dairy cows, and pregnant lactating dairy cows.** — *Amer. J. vet. Res.* **20,** 53-60. **2669**

The average adrenal gland weight and the width of the zonae glomerulosae and fasciculatae of non-pregnant lactating (Group 2) and pregnant lactating cows (Group 3) were significantly greater than those of mature non-pregnant heifers (Group 1), whilst those of Group 2 were significantly greater than those of Group 3. The amount of oil red O stainable lipid material in the glands increased from Group 1 to Group 3, the zonae glomerulosae having a greater tendency towards lipid accummulation than the zonae fasciculatae, but maximum amounts were much less than in cows with ketosis. Acicular birefrigent particles were found in all glands principally in the zonae glomerulosae but their quantity had no correlation with oil red O stainable material. All glands were negative to the Schultz cytochemical test for cholesterol.

—A. ACKROYD.

WHITEHEAD, R. G. & WEIDMANN, S. M. (1959). **The effect of parathormone on the uptake of ^{32}P into adenosine triphosphate and bone salt in kittens.** — *Biochem. J.* **71,** 312-318. [Authors' summary modified.] **2670**

Parathyroid hormone reduces the uptake of P into all the areas of hard tissue studied in kittens, especially the most active areas, and reduces the incorporation of P into the adenosine triphosphate of the cartilage. The possible importance of this ester in calcification is discussed. These effects on hard tissue are accompanied by a reduced growth rate, which suggests a more general effect of parathyroid hormone on metabolism.

AMOROSO, E. C. (1959). **Comparative anatomy of the placenta.**—*Ann. N.Y. Acad. Sci.* **75,** 855-872. **2671**

The author limited his account to a discussion of the evolution of viviparity; the placenta of reptiles; the yolk-sac and chronic placentas of mammals; uterine milk as a source of gonadotrophin; endocrine activity of the placenta during pregnancy; Grosser's classification of the chorioallantoic placenta, and the maternal placental circulation.—R.M.

REIS, P. J. & REID, R. L. (1959). *In vitro* **studies on the effect of pH and of glucose on ammonia accumulation in the rumen of sheep.** — *Aust. J. agric. Res.* **10,** 71-80. [Authors' summary modified.] **2672**

The effect of pH and of glucose on ammonia accumulation in rumen liquor from sheep was studied during 4-hour *in vitro* incubations. The pH was controlled over the range 4·5–7·3 by the use of sodium phosphate–citric acid buffer. Casein hydrolysate was added as a substrate for ammonia production.

There was an optimum pH for ammonia accumulation which varied between 6·0 and 6·7 on different diets, and which appeared to be correlated with the range of pH normally encountered in the rumen on each diet. Ammonia accumulation fell rapidly on the acid side of the optimum pH and usually less rapidly on the alkaline side. This effect of pH is most probably due to an effect on ammonia production, *i.e.*, an effect on deamination of amino-acids.

Glucose reduced ammonia accumulation to an extent greater than could be accounted for by the fall in pH due to the fermentation of glucose; protein nitrogen levels in the reaction mixture were significantly increased. It was concluded that the effect of glucose was due largely to a stimulation of ammonia utilization for synthesis of microbial protein and not to an inhibition of ammonia production.

I. MAGNANI, G. (1957). Azione degli estrogeni sull'attività diffusoria della jaluronidasi nel ratto ipofisectomizzato. [**Effect of oestrogens on the spreading action of hyaluronidase in hypophysectomized rats.**]—*Arch. Vet. Ital.* **8,** 399-403. [Summaries in English, French, German and Spanish.] **2673**

II. MAGNANI, G. (1957). Sull'azione dell'estrone e del progesterone sulla permeabilità tessutale e sui loro rapporti con la jaluronidasi. [**Effect of oestrone and progesterone on skin permeability and their relationship with hyaluronidase.**] — *Ibid.* 405-414. [Summaries in English, French, German and Spanish.] **2674**

I. Oestrogen, injected i/p, inhibited the action of hyaluronidase in normal rats and increased it in hypophysectomized rats.

II. The effect of oestrogen and of progesterone (alone or with hyaluronidase) on skin permeability was studied.—T.E.G.R.

AGUGGINI, G. & MELI, A. (1957). Ricerche sulla concentrazione ematica del colesterolo durante il periodo della gravidanza nel bovino. [**Blood cholesterol during pregnancy in the cow.**] — *Arch. Vet. Ital.* **8,** 415-419. [Summaries in English, French, German and Spanish.] **2675**

Blood cholesterol in 132 pregnant cows was studied. It increased between the 2nd and 9th months and returned to normal at parturition. It is considered that there may be some relationship between blood cholesterol and sex hormones (particularly progesterone) during pregnancy.

—T.E.G.R.

See also abstr. **2583** (calcium in blood and urine); **2716** (book).

PUBLIC HEALTH, VETERINARY SERVICES AND VETERINARY EDUCATION

ANON. (1959). **Educational qualifications of Public Health veterinarians.**—*Amer. J. publ. Hlth.* **49,** 113-118. **2676**

These are recommendations by the Committee on Professional Education in the U.S.A., approved by the Governing Council of the American Public Health Association. Over 100 personalities from public health schools and veterinary colleges, the American Board of Veterinary Public Health, the American Veterinary Medical Association, and also veterinarians in State health departments were consulted. Qualifications required include a D.V.M. degree, one year's post-graduate study in an accredited public health school, practical field experience in disease control, or in milk, meat and food hygiene. Post-graduate study may not be insisted upon if the candidate has proved his ability as a public health veterinarian by at least four years of satisfactory service.

His functions include promotion of veterinary public health activities in urban or rural districts, control and prevention of zoonoses, consultative and field assistance in public health matters, appraisal of danger to man arising from

certain diseases of animals, reporting of animal diseases, participation in planning, promotion and co-operation of programmes for the inspection of foods of animal origin, research activities, prevention and alleviation of radiation hazards, liaison with veterinary practitioners in public health problems, participation in public health education schemes, and liaison with official and voluntary bodies concerned with the prevention and control of zoonoses. Prospects and desirable personal qualities of a public health veterinarian were also discussed.—E.G.

See also absts. **2323** (eradication of TB. in Ireland); **2324** (TB. in Poland); **2325** (control of TB. and brucellosis in Germany); **2328** (TB.); **2329** & **2330** (TB.-meat inspection); **2332** (tubercle bacilli in "attested" milk); **2354** (salmonella in milk); **2355** (salmonella); **2356** (salmonella in eggs and meat products); **2362** (salmonella in ducks); **2365** (S. cholerae-suis food poisoning); **2371** (brucellosis); **2392** (TB., brucellosis); **2500** (psittacosis); **2560** (radioactive contamination of food); **2707** (book).

REPRODUCTION AND REPRODUCTIVE DISORDERS

MACPHERSON, J. W. & VESSELINOVITCH, S. D. (1959). **Electrophoresis of bovine semen—Part II. Fertilizing capacity of electrophoretically treated semen.**—*Canad. J. comp. Med.* **23,** 7-9. [Summary in French.] **2677**

Attempts were made to find a diluent in which bovine spermatozoa could be treated electrophoretically without lowering their fertilizing capacity. Of several diluents used only "treated milk" maintained normal progressive motility on the part of electrophoretically treated spermatozoa and yielded satisfactory conception rates.—C. L'ECUYER.

ADLER, H. C. (1958). Daggammel tyresaeds befrugtningseffektivitet. **[The breeding capacity of bull semen stored for one day.]** — *Nord. VetMed.* **10,** 644-652. [In Danish. Summaries in English and German. English summary modified.] **2678**

Records of an A.I.-centre were used to assess the breeding capacity of bull semen used on the day of collection as compared with the following day. It was concluded that the storage of the semen for one day decreased the conception rate. The decrease was less when cream was used for dilution instead of egg yolk–citrate. The number of infertile inseminations was increased on days following holidays.

ZHIVKOV, V. (1958). **[Studies on the biochemistry of semen. I. Reducible sugar and fructose in stallion semen. II. Fructose and fructolysis in bull and ram semen. III. Hexokinase in spermatozoa of stallion, bull and ram.]**—*Izv. Inst. Pat. Zhivotni, Sofia* **6,** 161-172; 173-181 & 183-190. [In Bulgarian. Summaries in English and Russian. Abst. from English summary.] **2679**

The content of reducing sugar in stallion semen averaged 20·5 mg.% and fructose averaged 1·2 mg.%. Glucose was utilized at the av. rate of 0·7 mg. per 10^9 spermatozoa in 3 hours. The amount of fructose utilized was very much smaller.

Breed differences in the fructose content of bull semen were studied. In 30 rams the fructose content averaged 640 mg.% but ranged from 280 to 1,190. Hexokinase activity in homogenates of spermatozoa was similar in stallion, bull and ram. The rate of phosphorylation of fructose by hexokinase was quicker than that of glucose in bull and ram, while in stallions the converse was found.—R.M.

HOLT, A. F. (1959). **Observations on artificial insemination of pigs.**—*Vet. Rec.* **71,** 184-187. [Author's summary modified.] **2680**

Pigs inseminated on the day after the first signs of oestrus had the highest conception rate. Those standing well for insemination also had a higher fertility. Fresh semen and small-diameter insemination pipettes were advantageous.

GOTINK, W. M. (1959). Een K.I.-proef bij varkens in Overijssel. **[Artificial insemination in pigs in Overijssel province.]** — *Tijdschr. Diergeneesk.* **84,** 163-178. [In Dutch. Summaries in English, French and German.] **2681**

An illustrated account of the technique of semen collection and insemination. Of 51 pigs inseminated after oestrus had been detected by a teaser boar, 35 (68·6%) became pregnant. Of 169 inseminated without the aid of a teaser boar, 106 (62·7%) became pregnant. For each insemination 150 ml. of diluted semen was used. The diluent was a 0·2% aqueous soln. of sodium bicarbonate with 4% glucose and 25% egg yolk. Diluted semen was stored before use at room temp. for from 2 to 8 hours.—R.M.

ROWLANDS, I. W. (1958). **Insemination by intraperitoneal injection.** — *Proc. Soc. Stud. Fertil.* **10,** 150-157. [Author's summary modified.] **2682**

The injection of spermatozoa into the peritoneal cavity (p.c.) of g.pigs shortly after ovulation results in a very high conception rate. In the natural process of reproduction the spermatozoa are present in the female tract for a period as long as 12 hours before ovulation. The

present work is an attempt to show that the time of fertilization after ovulation is the same after i/p injection of spermatozoa as it is after mating. It is suggested that spermatozoa retain their fertilizing power for a shorter period after injection into the p.c. than after coitus.

Only a very small proportion of cleaved eggs have been recovered from the Fallopian tubes of rabbits after injection of whole semen into the p.c. The insemination was made at varying times before the induction of ovulation to allow for capacitation of the spermatozoa. The injection of previously capacitated spermatozoa at about the time of ovulation is suggested as a means of increasing the fertilization rate.

No success has been achieved, as yet, in sheep.

MICHIE, D. & MCLAREN, A. (1958). **Experiments with egg transfer in the mouse.**—*Proc. Soc. Stud. Fertil.* **10**, 141-149. [Authors' summary modified.] **2683**

Interactions of transferred embryos with their foreign environment can be divided into interactions between (1) native and transferred embryos and (2) embryo and foster-mother. This paper reviews the authors' studies of such interactions using egg transfer in mice.

The transfer of fertilized eggs which are one day ahead of the native eggs in developmental stage causes a partial inhibition of the latters' implantation in the same horn of the uterus.

The procedure increases the frequency of placental fusion between adjacent embryos more than ten times. The causes and possible implications of the phenomenon are discussed.

Some inbred strains of mice have 5 lumbar vertebrae and others 6. The transfer of fertilized eggs from the former to the latter strongly influences the fostered young in the direction of the recipient's strain.

It is concluded that both embryo/embryo and embryo/foster-mother interactions exist, and deserve further investigation.

DOTT, H. M. (1958). **Species differences in the metabolism of epididymal spermatozoa.** — *Proc. Soc. Stud. Fertil.* **10**, pp. 73-79. [Author's summary modified.] **2684**

The metabolism of epididymal spermatozoa of bull, ram, rabbit, boar and stallion was investigated using the impedance change frequency of the spermatozoa as an indicator. Bull, ram and rabbit are active if oxygen is present, or under anaerobic conditions if fructose is present. Boar spermatozoa are inactive under anaerobic conditions and stallion spermatozoa are inactive in the absence of a substrate. The greatest activity in all species was found when aerobic glycolysis was possible and there was no activity when both glycolytic substrate and oxygen were absent.

GLOVER, T. D. (1958). **Experimental induction of seminal degeneration in rabbits.** — *Proc. Soc. Stud. Fertil.* **10**, 80-94. [Author's summary modified.] **2685**

Effects of experimental cryptorchidism on semen quality in rabbits were investigated.

Degeneration of semen induced by anchoring the testes and epididymides in the abdomen, was characterized by progressive oligozoospermia and distinct changes in the morphology of spermatozoa. Sex drive and total volume of ejaculates were unaffected.

Incipient seminal degeneration was marked by definite morphological features in the spermatozoa, despite there being no apparent effect on the incidence of active spermatozoa.

Attention is drawn to the similarity of these results with those which follow insulation of the scrotum in large animals, and the relative value of the different semen tests employed is discussed.

GUARDA, F. (1958). Histologische Untersuchungen über die postmortalen Veränderungen bei Stierhoden. **[Histology of post-mortem changes in bull testicle.]** — *Dtsch. tierärztl. Wschr.* **65**, 406-409. [Summary in English.] **2686**

Stored bull testicles did not preserve their histological structure for longer than 21 hours at room temp. or for more than 30 hours at 2°C. to −1°C. Spermatozoa were more resistant to autolysis than nuclei and cytoplasm of the germinative epithelium.—E.G.

NEWTON, O. M. (1958). Hiperqueratosis consecutiva a ulceracion del rodete prepucial, en un lote de ovinos. **[Hyperkeratosis following ulceration of the prepuce in rams.]** — *Gac. vet., B. Aires* **20**, 78-83. **2687**

An account of an outbreak of posthitis among 400 wethers which occurred in Argentina in 1922 and has not been reported before. There are 4 photographs of affected sheep. As the disease progressed the sheath became surrounded by a large area of hyperkeratosis of the skin. The condition died out after affected sheep were isolated and the rest dipped in a creolin bath, and no further outbreaks have since been seen by the author.—R.M.

VOLLMERHAUS, B. (1958). Die zyklischen Veränderungen des Endometriums beim

Rind. **[Cyclic changes in the endometrium of cows.]**—*Dtsch. tierärztl. Wschr.* **65,** 461-465. [Summary in English.] **2688**

At certain stages of the oestrous cycle some of the normal endometrial changes in cows may resemble inflammatory processes. During oestrus there is hyperaemia, oedema, leucocytic infiltration of mucous membranes, with degenerative epithelial lesions. These may persist even after the oestrous stages. In the early stages of oestrus there is vacuolation of epithelial cells. During pregnancy, sclerosis of uterine vessels is considered a normal feature. The importance of differential diagnosis between functional and pathological changes is stressed.—E.G.

SBERNARDORI, U. & REMOTTI, G. (1959). Contributo alla conoscenza delle modificazioni cicliche dell'endometrio nella bovina. **[Changes in the endometrium of the cow during the oestrous cycle.]** — *Veterinaria, Milano* **8,** 5-10. [Summaries in English, French, German, Spanish and Portuguese.] **2689**

Histological changes in the uterine mucosa of cows were studied. It is considered that uterine biopsy is of value for the study of the various phases of the oestrous cycle and for the diagnosis of certain types of sterility.

—T.E.G.R.

ERB, R. E. & EHLERS, M. H. (1958). **Fertility rates of cows bred following estrous cycles of varying lengths.**—*J. Dairy Sci.* **41,** 671-675. **2690**

The authors discussed data on 19,369 services over 25 years, and concluded that there was no need to postpone service because of an irregular oestrous cycle, providing the cycle was longer than 17 days and the cow was otherwise normal.—F. L. M. DAWSON.

MARTŸNOV, V. G. (1958). **[Procaine-penicillin paranephral blockage in the treatment of retained placenta in cows and goats.]** — *Veterinariya, Moscow* **35,** No. 12 pp. 56-57. [In Russian.] **2691**

Unilateral paranephral blockade of the splanchnic nerves and sympathetic trunk [*V.B.* **26,** 3552] was performed once on 13 cows and 17 goats with retained placenta of 1–3 days' standing. About 200,000 units of penicillin were added to each dose of procaine solution. In goats the placenta came away within 20 hours of treatment, but in cows it did not come away until 2–3 days later. It was claimed that treatment speeded recovery and lessened complications.—R.M.

SCHOOP, G. & SCHMITT, J. (1958). Zur Prophylaxe des pränatalen Fruchttodes beim Schwein. **[Prevention of embryonic mortality in pigs.]**—*Vet.-med. Nachr.* No. 3. pp. 147-161. **2692**

Prenatal mortality in pigs amounts to about 30%. There are seasonal variations, losses being highest in late spring. It was suggested that intra-uterine death depended largely on the lack of vitamin A and perhaps also vitamin E in the dam's diet.—E.G.

CH'ANG, T. S. (1958). **Reproductive disturbances of Romney ewe lambs grazed on red clover** (*Trifolium pratense*) **pastures.** — *Nature, Lond.* **182,** 1175. **2693**

A group of 111 Romney ewe lambs which had grazed continuously since weaning, 3 months previously, on pastures dominated by red clover was amalgamated with a group of 92 Romney ewe lambs which had grazed on perennial rye-grass/white clover pastures. Raddled, vasectomized rams were then introduced. Two days later, 29 lambs from the first group but none from the second had been marked by the rams. Laparotomy in 8 lambs showed no corpora lutea. Samples from the red clover pastures proved strongly oestrogenic when fed to ovariectomized mice. It is concluded that, if these findings are applicable to breeding ewes, oestrus without ovulation may be an additional complication in infertility of sheep.—M.G.G.

WESTIN, B. & ODEBLAD, E. (1959). **The effect of some steroid hormones on the incorporation of S^{35} in the mouse uterus following administration of radiosulphate.**—*Acta path. microbiol. scand.* **45,** 129-132. [In English. Authors' summary modified.] **2694**

The uptake of S^{35} into various layers of the wall of the uterus of the mouse was studied under different hormonal conditions. Injection of oestrogenic hormone caused rapid uptake by the subepithelial layer and injection of progesterone as well increased the uptake into the stroma.

STRINGAM, E. W. (1958). **Dwarfism in beef cattle.** — *Canad. J. comp. Med.* **22,** 400-403. **2695**

A description is given of the three most common types of dwarfs. These are: (a) "snorters", (b) "compact cattle", (c) "midgets". The probable genetic origin and economic importance are discussed. Various methods of diagnosing carriers with a view to eliminating them from breeding are evaluated. Some practical considerations for breeders are enumerated.

—C. L'ECUYER.

WATERS, N. F., BURMESTER, B. R. & WALTER, W. G. (1958). **Genetics of experimentally induced erythroblastosis in chickens.**—*J. nat. Cancer Inst.* **20**, 1245-1256. **2696**

Details were given of a genetical study of experimental erythroblastosis in 1,972 White Leghorns of six strains, maintained for 18 years without admixture of non-related stock. It appeared likely that inheritance of susceptibility depended on one pair of autosomal genes.

—E.G.

KING, J. W. B., EVANS, J. V., HARRIS, H. & WARREN, F. L. (1958). **The performance of sheep with differing haemoglobin and potassium blood types.**—*J. agric. Sci.* **51**, 342-346. [Authors' summary.] **2697**

Records of sheep with differing haemoglobin and potassium blood types were examined in a large flock of Scottish Blackface sheep.

Differences in reproductive performance, which would be subject to natural selection, and in growth rate, fleece characteristics, etc., which would be subject to artificial selection, were sought as an explanation for the gene frequencies observed in different breeds.

No significant differences were found in any weights or measurements.

The number of lambs produced by different types of ewe did not differ significantly, although there was some suggestion that haemoglobin heterozygotes produce a larger number of lambs at weaning. Study of the equilibrium of the population, however, showed that any heterozygote advantage, if it exists at all, can only be small.

See also absts. **2342** (C. pyogenes infection in cattle); **2391** (epididymitis and seminal congestion); **2407** (experimental genital infection of cattle with trichomonas); **2464** (balanoposthitis in rams); **2706** (report); **2717** & **2718** (books).

ZOOTECHNY

BLOMQUIST, M. (1958). Beobachtungen bei der elektrischen Betäubung von Schweinen. III. Einfluss der Betäubung auf die Tierkörperqualität im Hinblick auf Hämorrhagien und verschiedene Stromquellen. [**Observations on electrical stunning of pigs. III. Effects of stunning on carcass quality with reference to haemorrhages and different sources of current.**] — *Fleischwirtschaft* **10**, 661-664 & 669-70. [Summaries in English, French and Spanish. English summary modified.] **2698**

In Denmark pigs were originally bled 40–50 sec. after stunning. This method gave rise to complaints of blood splashes in the meat and impaired storage life.

Blood splashes generally occurred in 5–7% and quality impairment through splashes occurred in 0·5–1% of the carcasses. Capacitative potentials from the transformer to the electrodes appeared to make the blood splashes more frequent. Square and trapezoid wave patterns of the current appeared to be less harmful to the animals than sinusoid waves, judged from the occurrence of blood splashes, but do not by themselves, eliminate this type of damage; the blood splashes may, however, largely be eliminated if the pigs are bled right after stunning and before the clonic cramps set in, *i.e.*, less than 5 sec. after the termination of stunning.

STEPANOVA, E. N. (1958). [**Effect of exercise on the productivity and metabolism of high-yielding cows.**]—*Trud. Mosk. vet. Akad.* **23**, 138-147. [In Russian.] **2699**

The beneficial influence of at least 2 hours' daily exercise throughout the year was demonstrated by reference to milk yield and composition, food utilization and blood composition (haemoglobin, glucose, catalase activity, cholesterol, alkaline reserve).—R.M.

ARMSTRONG, R. H. & CAMERON, A. E. (1959). **Hexoestrol implantations of Blackface wether lambs.** — *Anim. Prod.* **1**, No. 1 pp. 37-40. [Authors' summary modified.] **2700**

Sixty-four Blackface wether lambs weaned some 8 days previously were divided into two groups. One group was implanted with 15 mg. hexoestrol.

The treated lambs gained an average of 2·32 lb., and 3·88 lb. live-weight more than the control group, after 4 and 7 weeks respectively. The mean carcass weight of hexoestrol-implanted lambs was 1·5 lb. greater than that of controls. Carcass grading provided no evidence of a deterioration in quality as the result of implantation. Light lambs responded at least as well as heavy lambs to the hormone.

See also absts. **2712** & **2720-2723** (books).

TECHNIQUE AND APPARATUS

ECKER, R. E. & LOCKHART, W. R. (1959). **A rapid membrane filter method for direct counts of microorganisms from small samples.** — *J. Bact.* **77,** 173-176. [Authors' summary.] **2701**

A technique is described for direct counting of microorganisms on membrane filter surfaces. The method requires no elaborate apparatus or complex manipulations. The validity of data obtained by this method is discussed, and the results are compared with those obtained by plate counts.

SYKES, J. A. & MOORE, E. B. (1959). **A new chamber for tissue culture.**—*Proc. Soc. exp. Biol., N.Y.* **100,** 125-127. [Authors' summary modified.] **2702**

A simple tissue culture chamber is described which permits phase microscopy at high magnifications and easy staining. It is also suitable for perfusion studies, observation of cells over extended periods, and time lapse photography.

GORSUCH, T. T. (1959). **Radiochemical investigations on the recovery for analysis of trace elements in organic and biological materials. Report to the Analytical Methods Committee by the Society's First Analytical Chemistry Research Scholar.**—*Analyst* **84,** 135-173. **2703**

A detailed survey of radiochemical techniques applicable to the determination of lead, mercury, zinc, selenium, arsenic, copper, cobalt, silver, cadmium, antimony, chromium, molybdenum, strontium and iron. There was a choice of two basic methods: recovery of the element after addition of radioactive tracer to the sample, and irradiation of samples in a nuclear reactor followed by radiochemical separation or gamma-ray spectroscopy.—R.M.

ENTEL, H. J. & WEINHOLD, E. (1958). Zur Blutentnahme beim Meerschweinchen. **[Collection of blood from g.pigs.]** — *Zbl. Bakt. I. (Orig.)* **171,** 523-525. **2704**

A cupping-glass for collecting blood from the ear flaps of g.pigs is described. It differs from previous instruments of this type in that the suction of the vacuum pump, to which it is connected, can be regulated by holding the thumb over a small hole in the glass. This prevents injury of the ear. Up to 8 ml. of blood can be obtained.—M.G.G.

See also absts. **2424** (anaesthetization of the tongue); **2562** (perfusion); **2586** (blood-calcium and magnesium); **2626** (peritoneal lavage); **2724** (book).

MISCELLANEOUS

ENGLISH, P. B. (1959). **Transthoracic oesophagotomy in a cat.**—*Aust. vet. J.* **35,** 41-43. [Author's summary modified.] **2705**

A successful transthoracic oesophagotomy in a 15-year-old cat to remove a fish-hook is described.

REPORT

NEW ZEALAND. (1958). **Report of the Department of Agriculture for the year ended 31 March 1958.** [TENNENT, R. B.] pp. 161. Wellington: R. E. Owen, Government Printer. **2706**

Animal Industry Division. Health of Livestock. £107,595 compensation was paid for diseased animals slaughtered and £64,170 for loss of production for cows and heifers condemned as reactors to the tuberculin test. The incidence of TUBERCULOSIS in cattle and pigs is given as: cows 9·2%, bullocks and heifers 0·8% and pigs 12·5%. Tuberculin tests in 169,929 cattle showed 3% infected.

Scheduled Diseases—Cases were TUBERCULOSIS 10,903; JOHNE'S DISEASE 254; ACTINOMYCOSIS and ACTINOBACILLOSIS 198; malignant growths or tumours (Epitheliomata) 108 animals condemned; ANTHRAX vaccination protected the animals on the five farms where cases were reported. BLACKLEG was controlled by vaccination; BOVINE MALIGNANT CATARRH—17 infected animals were condemned.

INFECTIOUS LARYNGO-TRACHEITIS of poultry was diagnosed for the first time; SARCOPTIC MANGE in pigs occurred on 37 farms; SCRAPIE of sheep has not recurred; LICE of sheep are still prevalent.

Non-scheduled diseases. BRUCELLOSIS — 58,225 calves were vaccinated with *Br. abortus* Strain 19. *Br. ovis*—Vaccination in sheep is used in control of outbreaks. Incidence of FACIAL ECZEMA was low. Liver damage was observed in numbers of lambs in Auckland. LEPTOSPIROSIS—vaccination appears to be effective. A few cases of LISTERELLOSIS were reported in sheep. There is no change in incidence of LIVER FLUKE on the east coast of North Island, where the disease is most prevalent.

POISONING. Losses have been caused by arsenic, lead, zinc, slag top-dressing insufficiently washed off before grazing, dieldrin, sodium mono-fluoracetate, ragwort, tu tu (*Coriaria ruscifolia*), bracken, macrocarpa and ngaio (*Myoporum lactum*). RYE-GRASS STAGGERS affected cattle on the east coast of North Island and in Taranaki. Some deaths occurred.

The normal incidence of SALMONELLOSIS in sheep was aggravated by overstocking associated with facial eczema precautions. Losses from TETANUS of 1 to 2% in lambs after docking were reported. VIBRIOSIS appears to be the cause of most of the abortions and neo-natal mortality in the Manawatu, Horowhenua and Taranaki districts.

HYDATID DISEASE. Losses from condemnation of livers amount to £1¾ million. Substantial progress is shown in the control measures for the eventual eradication of the tapeworm.

Tapeworms in lambs have been recorded. "Treatment is impracticable in young lambs."

There is a review of non-scheduled diseases in cattle, sheep, pigs and poultry which resemble those met with in the U.K.

Noxious Wild Life includes Opossums, Wallabies, Deer, Rooks, and Canadian Geese. Rabbits are now reduced to very low levels. Sodium mono-fluoroacetate (1080) has been used for their destruction and also for the 15,000 rooks reduced to 255 within a 15-mile radius of Christchurch.

Animal Research Division. The Laboratories at Wallaceville and Ruakura examined 46,722 specimens from 13,131 cases for diagnosis.

Research work. Sheep breeding investigations included "Fecundity in Ewes"; "Control of Time of Lambing and Lambing Percentage by Hormone Treatment" (results were variable); "Improving Fertility by Crossbreeding" (proved a success); "Bearing trouble in Ewes" ("The condition is not strongly inherited but affected ewes should be culled").

Sheep Nutrition. RICKETS caused by green feeds. Salts of iron, manganese and aluminium added to a grain ration in the proportions present in green feeds, fed to rats, increased the severity of rickets. A daily supplement of phosphorus given to barley-fed g.pigs prevented rickets. These elements probably have an effect similar to calcium in that they reduce the availability of dietary phosphates. Treating green feed barley with a fertilizer containing Fe, Mg and Al salts caused rickets among g.pigs fed with the barley from this source. Rickets-producing barley and short rotation rye-grass were lower in phosphorus than samples which did not produce rickets.

Sheep Disease Investigations. FACIAL ECZEMA. Experiments to test a theory of the value of top-dressing of the suspected pastures with mixtures containing Cu_2SO_4 or cobalt sulphate showed practically no variation of liver damage from that of the controls on non-treated areas.

BRUCELLOSIS IN SHEEP. In field trials to test the value of immunization of rams against *Br. ovis* infection (epididymitis), using 3 groups of 2-tooth rams (1) given adjuvant vaccine plus *Br. abortus* Strain 19, (2) given adjuvant vaccine alone, (3) non-vaccinated, the incidence of infection was, respectively, 1%, 7·2% and 21·3%. Investigation of the two-toothed rams and older rams six weeks after mating showed 659 adjuvant vaccine treated 6·7% infected, the non-vaccinated 788 two-tooth rams 16% and 2,453 older rams 17·7%.

Incidence of Intra-uterine Infection in Perinatal Mortality. In two groups totalling 211 lambs there was intra-uterine infection and/or dystokia in 114.

Incidence of types of infection—in two groups totalling 122 lambs, 29 were *Brucella ovis*, 17 *Vibrio fetus*, 75 *Toxoplasma* and 1 streptococci.

Experimentally ovine toxoplasma was transmitted to three months pregnant ewes by the s/c and i/v routes but not *per os* or by intranasal instillation. No ewes became infected when the method was *per vaginam* at time of mating.

VIBRIOSIS in ewes was a common cause of lamb mortality. In an experiment rams were infected by various routes (conjunctivally; preputially; orally); when mated none transmitted the infection.

MUSCULAR DYSTROPHY (White muscle disease) was prevalent in lambs in Canterbury and Otago. The main lesion was severe myocardial degeneration with minimal skeletal muscle lesions. Vitamin E is used in treatment and beneficial results are reported. Biochemical research is in progress.

Cattle Diseases Projects. (1) Streptopen pessaries failed to cure an experimental infection of cows with *V. fetus*.

(2) DIAGNOSIS OF *V. fetus*. An indirect haemagglutination test for the detection of antibodies to *V. fetus* has been developed. The test is more sensitive than the bacterial agglutination test and is equally sensitive in the detection of antibody in vaginal mucus, which means earlier diagnosis.

The incidence of BRUCELLOSIS in vaccinated herds during five years was 3·3%.

LEPTOSPIROSIS. In young calves experimentally infected with *L. pomona*, treatment with streptomycin 1 g. or penicillin up to 10^6 units daily on the 4th, 5th and 6th days of the disease reduced the incidence of acute or fatal infection.

Streptomycin 3 g. or 3 mega-units of penicillin given on three successive days to calves in the early stages of experimental leptospirosis delayed but did not entirely prevent the excretion of leptospires in the urine. When the dose was increased to streptomycin 4 g. on three successive days shortly after leptospires had appeared in the urine, no leptospires were subsequently detected in the urine, whereas they persisted in untreated carriers.

VIRUS PNEUMONIA OF PIGS (V.P.P.). A pneumonia of pigs widespread in New Zealand was found to be virus pneumonia of pigs. Of 1,000 sets of lungs from porkers 64·3% had typical lesions of V.P.P.

ABORTION AND PERINATAL DEATHS. Leptospiral intra-uterine infection was the cause of deaths of piglets at full term in two sows. Leptospires were found in the kidneys of three piglets examined and in another case one of two litter mates that died had leptospires in the liver. These three cases are a small proportion of the total of perinatal deaths investigated. Leptospirosis is a relatively uncommon cause of perinatal mortality.

Poultry Diseases. INFECTIOUS LARYNGOTRACHEITIS was confirmed in May 1957 and has since been found to be endemic. The strain is a mild one which when inoculated into susceptible birds protects them against a virulent Australian strain.

AVIAN TUBERCULOSIS. Avian type *M. tuberculosis* was isolated from cattle specimens and old fowls.

"Q" DISEASE OF CHICKENS has some resemblance to pullet disease. "The P.M. findings in experimentally produced potassium deficiency in chickens are almost identical with those seen in "Q" disease, except that in the latter the chickens are well grown." Clinically and post mortem it resembles avian monocytosis described in Australia "but the N.Z. chickens have not the same blood picture."

Surface Application of Insecticides for Control of LICE and KEDS on sheep. Surface application of aldrin and dieldrin as dust or fine spray was effective in controlling lice and keds especially when applied up to three months after shearing. With a 3% dieldrin dust the initial kill was slow but the sheep were protected from lice for over six months. Spraying with 0·2% dieldrin (120 lb. per sq. inch pressure) or with 0·125% dieldrin (15 lb. per sq. in.) gave similar results.

Trace Elements. Copper and Molybdenum. A fifth crop of lambs has been reared from ewes on pastures top-dressed to keep molybdenum at 8 p.p.m. In one instance bone fragility occurred in 20 lambs, but there was no ataxia. Ewe lambs have now been reared to breeding age on pasture with even higher Mo content and are being mated and no effect has been noted.

Iodine: GOITRE on Thousand-headed Kale. The goitrogenic property of kale is probably not due to single substance. Use of radio-iodine shows that the antithyroid effect is partly due to an agent of the thiouracil type which blocks the organic binding of iodine, and that kale affects rabbits like thiocyanate rather than thiouracil. This hypothesis needs confirmation but is supported by the presence of thiocyanate in the milk of goats grazing on kale; this milk has an antithyroid action on rabbits. Since congenital goitre was produced in 1957 by the administration to pregnant ewes of both thiocyanate and thiouracil, it is possible both agents play a part in the congenital goitre due to kale.

By comparing the radioactivity in the foetal thyroid 72 hours after injection of ^{131}I with that of the maternal thyroid, it has been found that from 60 to 90 days of gestation the foetal accumulation rate is similar to the maternal but that between 90 and 120 days it increases to five times the maternal and remains at that level till parturition. This explains why lambs with grossly abnormal thyroids are born to ewes without clinical goitre.

Toxicology. Laboratory rats did not become anaemic when fed kale from a field case of the disease, with deaths in sheep.

RHODODENDRON POISONING in sheep—7 of 300 sheep died after eating cut rhododendron. Symptoms were slow, groaning expiration followed by short, rapid, gasping inspiration after excitation. After a few minutes breathing returned to normal, except that respiration was rapid. Much frothy saliva was present and the gait was ataxic. P.M. findings—congestion of the lungs with sub-pleural haematomas up to an inch in diameter. The deaths were spread over two weeks. There were considerable quantities of rhododendron leaves in the rumen of the first three sheep examined.

METALDEHYDE POISONING in ducks. 9 of 21 ducks died after fits of trembling and ataxia. Crop contents from two were highly positive for metaldehyde on the sublimate from crop con-

tent and after conversion to acetaldehyde with dilute sulphuric acid.

FODDER BEET POISONING IN SHEEP. In dosing trials two types of poisoning were obtained: a quick death within 1½ days, and death from 4–15 days after dosing. Cane sugar trials emphasize that only the latter deaths can be directly attributed to the sugar content of the beet.

About 8 lb. of fresh beet of any potent variety per 100 lb. liveweight is sufficient to kill. Beet with a sugar content of 5·3 g. sugar/lb. liveweight is critical.—J. A. GRIFFITHS.

BOOK REVIEWS

DRÄGER, H. (1958). Entstehung und Verhütung von Lebensmittelvergiftungen durch Salmonellabakterien. **[Causes and prevention of food poisoning with salmonella bacteria.]** pp. v+98. Jena: Gustav Fischer Verlag. DM 5.60. **2707**

This monograph is written by the veterinary director of a large abattoir and is largely based on his own experience of tracing the causes of food poisoning and of interpreting the German laws on meat inspection. There is a comprehensive discussion on pre-slaughter infection of farm animals with salmonella, and bacteriological examination of carcasses.—R.M.

POLLARD, M. [Edited by.] (1959). **Perspectives in virology. A symposium.** pp. xix+312. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. 56s. **2708**

This book is the result of a symposium arranged in memory of F. R. Beaudette, a most eminent worker on diseases of poultry particularly Newcastle disease and other virus diseases. The 45 participants came mainly from the U.S.A. with a few from Europe, five of them were veterinarians.

Thirteen papers were presented and discussed. The subjects included virus multiplication (Schafer, W); viral neoplasia (Beard, J. W. and others) with an account of some of the new work on lymphomatosis and avian leucosis; the natural history of hog cholera, in which Shope, R. E. discussed his belief that lungworms act in some unexplained manner as carriers of "masked" virus. This theory postulates a very complicated chain of events involving the pig, lungworms, earthworms, the virus in virulent and in "masked" forms, a provocative stress factor and a "factor X" of which nothing is known but which "plays a deciding role in determining" whether masked hog cholera virus will respond to "the provocative stress". Shope's contribution met with comparatively little criticism in the subsequent discussion. When asked for his opinion on why the disease had not established itself in Canada, he said: "I have a feeling that earthworms are either not as common up there as they are in our pig pastures, or they haven't been as well seeded with lungworms as have our earthworms." He was not asked for his opinion on the successful eradication of the disease from Australia, New Zealand and Ireland; specific immunity as a factor in the ecology of animal viruses (Traub, E.); Asian influenza, a challenge to epidemiology, in which Andrewes suggested that the virus may have originated in pigs in China.

The other papers while not of much direct veterinary interest are all of interest to specialists in virology.

Mention must be made of the extremely fascinating story of the 'tulip' virus so well told by Dubos, R. J. in a paper entitled "Tulipomania and the benevolent virus". In this Dubos poses the question whether some of the very numerous new viruses which are being discovered may be beneficial rather than harmful to health.

HALLAUER, C. & MEYER, K. F. [Edited by.] (1958). Handbuch der Virusforschung. 4. Band. **[Handbook of virology. Vol. 4.]** pp. xv+688. Vienna: Springer Verlag. 251s. 6d. **2709**

This is a supplement to the Handbook of Virology founded by R. Doerr & C. Hallauer, volumes 1 & 2 of which were published in 1939 and volume 3 in 1950. It is a collection of 10 monographs in English, German or French, classified into a general and a special section. The general section contains the following :— Genetics of animal viruses, by F. M. Burnet; Genetics of bacteriophages (in French), by P. Fredericq; Viruses of insects, by G. H. Bergold; Arthropods as vectors and reservoirs of phytopathogenic viruses, by W. C. Reeves; Identification of viruses pathogenic for man by means of tissue culture (in German), by W. Klöne.

The special section contains :— Seasonal encephalitides (in French), by P. Lépine & P. Goube de Laforest; Foot and mouth disease virus (in German), by H. Röhrer & G. Pyl; Columbia SK group of viruses, by C. W. Jungeblut; The virus of poliomyelitis, by S. Gard; The Coxsackie group of viruses (in German), by H. Löffler. Each article is an extensive review

of the literature: that on tissue culture cites 359 references while that on foot and mouth disease virus cites 485. The book is excellently printed and bound, but at £12 it is possibly too expensive for the individual virologist whose interest may be confined to only two or three of the articles.—R.M.

BERGER, E. & MELNICK, J. L. [Edited by.] (1958). **Progress in medical virology. Volume 1.** pp. 304. Basle & New York: S. Karger. 78s. **2710**

The first volume of this new international series contains 9 review articles on the following subjects. Nucleic acid as the carrier of viral activity, by J. S. Cotter; significance of the viral carrier state in tissue culture systems, by H. S. Ginsberg; advances in the study of enteroviruses, by J. L. Melnick; Coxsackie virus infections of the newborn, by J. H. S. Gear; experiences in the production of poliovirus vaccines, by I. W. McLean & A. R. Taylor; the 1957 influenza pandemic, by K. E. Jensen & others; tick-borne spring-summer encephalitis, by A. A. Smorodintsev; Kyasanur forest disease in India, by T. H. Work; direct virus antibody flocculation reactions, by W. Smith.—R.M.

GEBAUER, O. (1958). Die Dasselfliegen des Rindes und ihre Bekämpfung. [**Warble flies of cattle and their control.**] pp. 97. Jena: Gustav Fischer Verlag. [Parasitologische Schriftenreihe Heft 9.] DM 10.20. **2711**

This account of *Hypoderma bovis* and *H. lineatum* concentrates on historical, morphological and biological aspects. Morphology of the adult flies and of the larvae is described in detail and the migratory route of larvae is discussed. The pathological action of the larvae on cattle and the pharmacological action of body juices of the larvae are dealt with. Methods of control are discussed. Gebauer discusses critically the literature on the subject, and there is a 22-page bibliography. The many illustrations include photomicrographs of larvae and of lesions caused by them, and one colour plate.—R.M.

GRASHUIS, J. & VAN VLIET, N. (1958). Doelmatige varkensvoeding. [**Correct pig feeding.**] pp. 266. Zelhem: Drukkerij Remmelink. 3rd Edit. 5f. **2712**

This book provides all that a Dutch farmer would wish to know about the practical feeding of the various classes of pig. The previous edition appeared in 1950, and since then a chapter on antibiotics has been added. Statistics give the pig population of the Netherlands as 2·55 million in 1956, compared with 1·55 million in 1939.

—R.M.

MARSH, H. (1958). **Newsom's sheep diseases.** pp. xiv+406. London: Bailliere, Tindall & Cox, Ltd. 2nd edit. 72s. **2713**

The veterinary profession still awaits a really good work of reference on sheep diseases but Newsom's book goes far towards filling this gap. The preface states that the writing is intended partly for the use of sheep producers but, in the reviewer's opinion, it is more suitable for veterinary surgeons and veterinary students. If future editions were written with only the veterinary profession in mind, the book could become a classic.

Firm conclusions have been drawn only where they appear to be justified. In some cases, notably in the sections devoted to deficiencies and metabolic diseases, conflicting opinions are presented and the reader is left to make up his own mind. This appears to be the ideal method of describing diseases about which knowledge of aetiology and treatment is not complete.

Diseases are considered under the headings: 'Infectious Diseases', 'Parasitic Diseases'', 'Nontransmissible Diseases' and 'Poisons'.

In the section devoted to infectious diseases, there are very few conditions which would not be met with in Great Britain. The amount of discussion about each disease is adequate except for the section headed 'Diagnosis'; in almost every case the reader is left with the impression that this should be expanded. It would be particularly helpful if hints were given on specimens required for laboratory diagnosis.

External parasites, flukes and tapeworms are dealt with adequately but the section on nematodes is the most disappointing part of the book. Thirty-three pages are devoted to detailed descriptions of individual species while gastrointsetinal helminthiasis is dismissed in just over two pages. There are many works of reference on the details of parasitology so that the detailed descriptions are redundant. Conversely, there are very few informative papers on disease caused by worms and this section could with advantage be increased in future editions.

The writing on nontransmissible diseases is good and should be of interest to all British veterinary surgeons who are concerned with sheep.

Printing and binding are good and the index is above average. Lists of references are not comprehensive but they appear to be accurate and are sufficient for this type of book.

—G. B. S. HEATH.

ORLOV, F. M. [Edited by.] (1958). [**Diseases of pigs.**] pp. 462. Moscow: Gosud. izd.

sel'skokhoz. literatury. 13r. 45k. [In Russian.] **2714**

This major textbook is produced on the same lines as "Diseases of cattle" published in 1956 [*V.B.* **25,** 313]. It is a collection of 40 monographs, each dealing with one disease, by 26 different authors. Each of the 30 chapters on infectious diseases is allocated an average of 7 pages, the more important receiving about 18 pages (*e.g.* swine fever, by P. S. Solomkin; erysipelas, by V. T. Kotov; and paratyphoid, by M. M. Ivanov). Helminth parasites are described by I. V. Orlov & B. S. Moskalev in 68 pages. The 70-page section on non-infectious diseases is limited to chapters on diseases of the respiratory and digestive organs, metabolic disturbances and vitamin deficiencies, and poisoning. One criticism that may be made is that there are very few references to non-Russian literature published since about 1953, so that some of the more recent developments outside the U.S.S.R. have not been included. The book costs 16s. 6d. in the United Kingdom.—R.M.

EVERS, N. & CALDWELL, D. (1959). **The chemistry of drugs.** pp. 415. London: Ernest Benn Ltd. 84s. **2715**

This is a revised edition of Dr. Evers' book which was last revised and enlarged in 1938. Since that date many new and important drugs have come into use, especially the antibiotics and the sulphonamides. For this reason the book has been re-written completely, this time with the help of D. Caldwell. It will be welcomed by many research workers and others who require a reference work which gives clear concise accounts of the chemistry of several hundreds of drugs.

The book is divided into two approximately equal parts, the first dealing with synthetic and the second with naturally occurring drugs. Each of the 38 chapters is concerned with a particular class of drug, but since the authors have heroically undertaken to cover this vast field in the compass of some 400 pages we find that bactericides and bacteriostats are dismissed in 23 pages, steroid hormones in 26 pages and antibiotics in only 15 pages. Mention of each individual drug is therefore often quite brief, but in most cases the chemical constitution, origin, synthesis and, in the case of naturally occurring drugs, the method of extraction, are given together with references to the literature.

All the drugs described in this book are in therapeutic use and besides there being a satisfactory index to them, two very useful appendices make it possible to refer to a given drug quite rapidly. The first sets out Official or Approved names against their proprietary equivalents and chemical names, while the second gives proprietary names with their Official or chemical equivalents.—D. S. PATTERSON.

BRAZIER, M. A. B. [Edited by.] **The central nervous system and behaviour. Transactions of the First Conference February 23, 24, 25 and 26, 1958. [Sponsored by the Josiah Macy, Jr. Foundation.]** pp. 450. New York: Josiah Macy, Jr. Foundation. $5.25. **2716**

One of the aims of this book is to foster closer relationships between scientists of the United States and of the U.S.S.R. It traces the development of Russian science from Lomonosov, the father of Russian science, through Sechenov, the father of Russian neurophysiology, on to Pavlov whose work gave international impetus to the experimental study of conditioning. A pictorial survey of many Russian scientists is accompanied by short, interesting biographical notes which include the contacts made by Peter the Great and the early Russian scientists with workers such as Leibniz, Claude Bernard, Ludwig, Helmholtz, Du Bois-Reymond and Heidenhain.

American scientists, drawn from various disciplines related to neuro-physiology and psychology, discuss, around one conference table, Sechenov and his work and then the work of Pavlov and his contemporaries. They then proceed to present-day American work on conditioning, on electrical stimulation of the intact and the selectively injured nervous system and on changes in the electroencephalogram during conditioning. This book records these discussions including the doubts and the questionings of which there are many; thus it is not to be regarded as a text-book but one which paves the way for future research by free exchange of results of work in new fields.

Neurosis in the pig can be experimentally induced by frequently altering the significance of the stimuli to which the animal has become conditioned. Veterinarians will also be interested to read that if one of a pair of very young twin lambs or kids is removed from its mother and conditioned by darkening the room for 10 seconds and then following with a mild shock of a fore limb and this sequence is repeated 20 times at 2-minute intervals then the young animal, though allowed to return to its mother immediately after the treatment, will die within a year and usually within 6 months, whereas the other twin, given similar treatment except in that it is not parted from its mother, remains healthy.—A. BROWNLEE.

GASSNER, F. X., JENSEN, R. & HILL, H. J. [Edited by.] (1958). **Reproduction and infertility. 3rd symposium, Colorado State University, Fort Collins, Colorado. [Sponsored by the College of Veterinary Medicine and the Agricultural Experiment Station.]** pp. vi+273. London (New York, Paris & Los Angeles): Pergamon Press. 42s. **2717**

The symposia reported in this series are biennial; they have for object the wider dissemination of knowledge otherwise available only to specialists. However only about half the work described has so far appeared in print elsewhere, so that the additional purpose has been served of widening the opportunities for publication of important results. This book is by far the best of its kind that the reviewer has seen; it is packed full of significant and exciting work. The selection of papers has been made with a comprehensive knowledge of the subject; the relative importance of the various aspects has never before, in the reviewer's opinion, been so justly assessed. Specific infection problems occupy little more than 40 pages — almost too little, especially as on balance the papers seem rather below the standard of the rest of the book. However in this regard judgment may be hampered by the inevitable delay in publication; the symposium was held in July 1957. Even so too much stress, not justified by the experimental evidence, seems to be laid on the efficiency of antibiotic treatment of semen in the control of bovine vibriosis; and, conversely, the value of curative treatment of the individual bull is underestimated. It is refreshing to read, for once, that "the oestrogen-stimulated mucosa is perhaps more susceptible to invading infective agents"—a statement entirely justified by consideration of the literature as a whole.

A paper on cytological changes in the 16 to 33-day-pregnant bovine corpus luteum may provide a valuable basis for further investigation of early foetal death, a crucial current problem. Two papers from investigators, one European, in the field of human medicine, on prevention of habitual abortion by progestins, and classification of male hypogonadism, are of great comparative interest; especially the latter, which gives many pointers to anyone contemplating a programme of similar research on the bull, which is greatly needed. There is an interesting basic biochemical paper on steroid biosynthesis and useful contributions on oestrogen content of porcine and bovine body fluids; including the contents of follicular cysts in the cow. A clinical paper on problems of infertility in the dairy herd is weak on endometritis, especially concerning the literary background, but contains a most competent and fascinating study of cystic ovarian disease. There are two reports of prophylactic treatment of the uterus with antibiotics during the puerperium *worsening* subsequent conception rate, (although other and convincing work to the contrary is extant). A review on the status of therapy in animal infertility includes much information not readily available otherwise, but ignores the rather conclusive counter-evidence by Gullickson *et al.* (1950), in still concluding that vitamin E therapy may be effective. The interesting idea is advanced that excessive fat in the fundus of the ovarian bursa of the cow may interfere with the egg pick-up mechanism.

The final section includes a single able paper on investigation techniques for bull semen metabolism, particularly with regard to glycine, and a discussion on the practical aspects of deep-freezing in artificial insemination. There was agreement that a mixed service of fresh and frozen semen could not be run from one centre indefinitely. In the more southerly States of the U.S.A. summer-collected semen generally gives poor results when frozen; satisfactory survival in the frozen state often does not exceed 2½ years. The discussions after the papers were conducted in an admirably scientific spirit.

—F. L. M. DAWSON.

HARRISON, R. G. [Edited by.] (1958). **Studies on fertility. Including papers read at the Conference of the Society for the Study of Fertility, London, 1958. (Being Vol. 10 of the Proceedings of the Society.)** pp. x+176. Oxford: Blackwell Scientific Publications. 25s. **2718**

Of the fifteen papers presented in this volume, four are of direct veterinary interest. They are: species differences in the metabolism of epididymal spermatozoa, by H. M. Dott; experimental induction of seminal degeneration in rabbits, by T. D. Glover; experiments with egg transfer in the mouse, by D. Michie & A. McLaren; insemination by intraperitoneal injection, by I. W. Rowlands. Other papers deal with the uptake of trypan blue by the epididymis (J. H. Grant); and the effect of ischaemia on the testes of young rats (W. R. M. Morton).—R.M.

LERNER, I. M. (1958). **The genetic basis of selection.** pp. xvi+298. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. 64s. **2719**

Lerner is well known through his previous books, "Population genetics and animal improvement" [*V.B.* **21**, 1901] and "Genetic homeostasis" [*V.B.* **25**, 1852]. The present

book is designed for the reader who has a thorough knowledge of modern genetics but lacks an extensive background in mathematics and statistics. It is claimed that this is the first book devoted entirely to selection. Greater emphasis is placed on artificial selection rather than natural selection and examples are drawn from experimental data on the fowl.—R.M.

BOGART, R. (1959). **Improvement of livestock.** pp. xx + 436. New York (& London): Macmillan Company. 47s. **2720**

The author states in his preface that he hopes, as a result of reading this book, farmers and ranchers will understand the principles of livestock improvement, so that they will use more effective breeding programmes. The book, however, is of more value to the student who has considerable technical knowledge of genetics, than to the livestock owner engaged in the production of food. Many of the chapters require a high understanding of mathematical principles and would be far too scientific for the average farmer. The book is very comprehensive and well illustrated, especially with regard to abnormalities and inherited lethals. Considerable details are provided on how to keep records for the selection of animals capable of high production. Twenty-one pages of references to published work are included, which will be of great help to those seeking further knowledge in the various aspects of this complicated subject.

—A. J. WILSDON.

MILLER, A. C. & ROBERTSON, E. D. S. (1959). **Practical animal husbandry.** pp. xii + 650. Edinburgh (& London): Oliver & Boyd. 7th Edit. 31s. 6d. **2721**

This edition embodies many small improvements in lay-out and additions to bring it up to date, such as notes on deep litter, broilers, artificial insemination of pigs and chinchillas (6 lines only). It is still the standard British book on animal husbandry.—R.M.

KAYS, J. M. (1958). **Basic animal husbandry.** pp. xiii + 430. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. $9.35. **2722**

Described as an introduction to the science of developing the most useful animals, this book is intended for students of agriculture, farmers and laymen. It concentrates on the avrious uses to which cattle, sheep, pigs and horses are put, with emphasis on the judging of animals and the marketing of animal products. Breeding, feeding and management are dealt with briefly, and short notes on common diseases are included under this heading. There are numerous photographs of high quality. It gives a broad picture of animal industry in the U.S.A.—R.M.

ELTON, C. S. (1958). **The ecology of invasions by animals and plants.** pp. 181. London: Methuen & Co. Ltd. 30s. **2723**

Books on ecology often make dull reading to all except the expert. It is a pleasure therefore to recommend a book which has something to offer to all with a general interest in this subject. Much of its value stems from the wide range of both plants and animals with which the author is familiar. For instance on a typical page there is reference to the failure of the white dead-nettle to establish itself in close vegetation, the defeat of the English oyster by the invading American and Australian molluscs, the replacement of the native red squirrel by the American grey in parts of England, and the unnoticed spreads in Britain of water shrimps from North America and the Caspian Region. These invasions not only happened in the past but also are occurring now and they make exciting reading.

In many of these invasions man plays an important part both in introducing new species and in attempting to control them. In the author's view the modern trends in agriculture, together with the increasing use of herbicides and insecticides, lead to the instability of populations perhaps with unfortunate consequences. Those concerned with these practices may not accept these views, but they cannot ignore them. There will be general agreement, however, on the need for more work on animal and plant communities with particular regard to their conservation.—C. B. OLLERENSHAW.

PALLASKE, G. & SCHMIDEL, E. (1959). Pathologisch-histologische Technik. **[Histopathological technique.]** pp. vii + 225. Berlin (& Hamburg): Paul Parey. DM 39.60. **2724**

This is a very useful guide to histopathological technique for the use of veterinary students and laboratory assistants, giving details of apparatus and methods of fixation, embedding, microtomy, staining and mounting of histological material. Practical hints on general, phase-contrast, dark-field, fluorescence, and polarization microscopy, and formulae for various laboratory reagents are given in an appendix. There are 20 black-and-white illustrations in the text and coloured plates of 16 photomicrographs. The work is well indexed and its presentation very neat.—E.G.

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Reports of Departments, Special Reports, reprints, etc., etc., should be sent as soon as they are issued.

Books for Review.

The Editor will be glad to receive books for review in the *Veterinary Bulletin*.

Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature are, however, included in *Index Veterinarius;* so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius,* where titles of all publications indexed by the bureau are fully cross-referenced.

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The abbreviations used in *Index Veterinarius* and *The Veterinary Bulletin* are those of the *World List of Scientific Periodicals published in the years* 1900-1950, 3rd Edit. (1952), London: Butterworths Scientific Publications.

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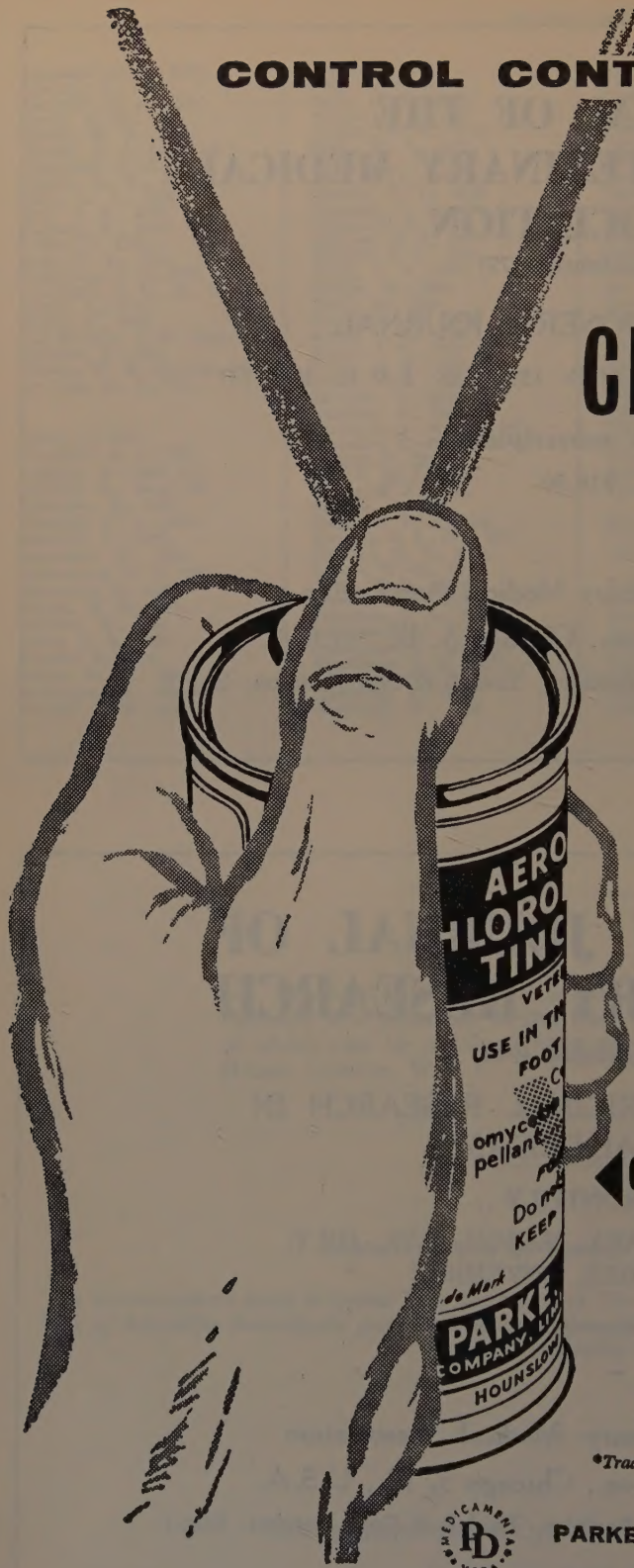

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